VOL. 9. JULY, 1905. NO. 1.

THE AMERICAN BOTANIST.

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A MONTHLY JOURNAL FOR THE PLANT LOVER.

Issued on the 15th of Each Month.

WILLARD N. CLUTE, - - - EDITOR.

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WILLARD N. CLUTE & CO., Publishers. Binghamton, N. Y.

Entered at the Post Office at Binghamton, N. Y., as Second Class matter, Aug. 22, 1901.

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Books Recommended

In this department we shall, from time to time, recommend books that to us seem of special value to readers of this journal.

III.—Fern Books.

It all depends upon what you want the book for. If a technical manual with descriptions of the North American species, get Underwood's "Our Native Ferns" ($1.08); if a popular handbook for Eastern America select either Parson's "How to Know the Ferns" ($1.63), Water's "Ferns" ($3.34) or Clute's "Our Ferns in Their Haunts" ($2.15). Parson's book is well written but the keys are difficult. Water's book has two technical keys and is illustrated with many photographs. Clute's book has more text than either, has illustrated keys, colored plates and the 225 other illustrations are by an artist of ability. The real fern lover needs all three. Eastman's "New England Ferns" ($1.25) is a new book that is useful but not so comprehensive as the others, while Dodge's "Ferns and Fern Allies of New England" (50 cts.) is a complete little technical manual. Clute's "Fern Collector's Guide" (50 cts.) tells where to find ferns and how to press, mount and identify them. Useful to take into the field.

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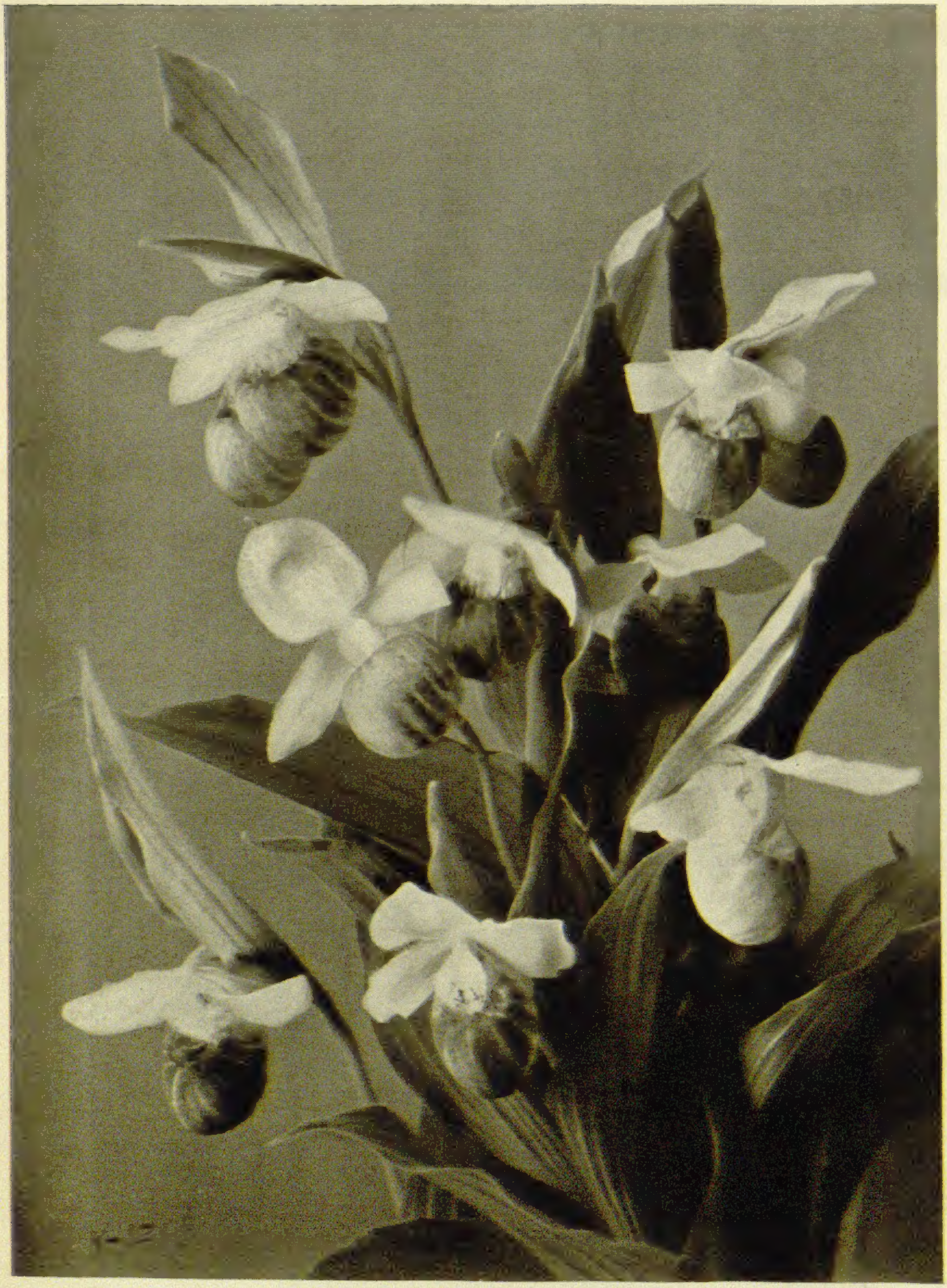

THE SHOWY QUEEN.

(Cypripedium reginae)

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v.9-10
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THE AMERICAN BOTANIST.

VOL. IX. -10 BINGHAMTON, N. Y., JULY, 1905. — June 1906 No. 1.

HOOSAC VALLEY AND ITS FLOWERS AND FERNS.

BY GRACE GREYLOCK NILES.

ILLUSTRATED BY KATHERINE LEWERS AND THE AUTHOR.

> "When my thoughts are sensible of change, I love to see and sit on rocks which I have known, and pry into their moss, and see unchangeableness so established."—THOREAU.

THE closing of the Green and Taconic Mountains about the valley of the Hoosac has thrown together some of the most ancient rock-formations of the world. The peculiar soft portions of the talcoid schists of the latter, averaging two thousand feet in thickness, have created abrupt erosions along the eastern slopes, resulting in deep and picturesque glens. The western sides are more gradual in their approach to the lowlands.

Two ranges of Eolian limestone pass northward through the Valley, uniting near Mount Anthony, Bennington, and extending through the County. The Hoosac Highlands therefore, with their deeply eroded chasms through which laughing rills and roaring cascades reach the deep and peaceful plains, afford rare hiding places for beautiful flowers and graceful ferns.

The western slopes of the Tunnel Range—the "forbidden mountain," separating the Deerfield Valley from the Indian's early hunting grounds of the peaceful "Hoosuck" send down several small streams which irregularly wind through small tamarack and pine swamp areas on their journey to the river.

During May and June the borders of Tunnel Brook are fringed with many beautiful species of early spring flowers. A climb up the mountain reveals the woodman's clearing massed in with trillium, clintonia, dogwood blossoms, jack-in-the-pulpit, dog's tooth lilies, dwarf cornel and

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shamrock blossoms. Numerous species of violets delight the collector of rare varieties and conspicuous among these is the sweet Canada violet, nodding half hidden among the tender maiden-hair ferns and showy orchises. Later in May the dainty footsteps of the pink moccasin-flowers (*Cypripedium acaule*) may be traced over the ridges beyond. One may follow the trail of this orchis far summitward to the Central Shaft of the Tunnel Mountain.

Standing upon the bluffs of the Ragged Mountains, across the Valley of the Ashuilticook, one may observe the path leading from the piles of rock near the West Shaft. A line of telegraph poles now ascends the mountain in nearly the same place as the Indians chose to make their trail when raiding the early settlers of the Deerfield Valley. Many granite boulders lie thrown about the slopes,—pitched perhaps by the Giants of Earth, each ot which is reputed to have had fifty pair of hands and to have hurled a hundred stones at a single throw! One of these rocks rests near the brook in the ravine east of the West Shaft road. This, however, was doubtless drifted here from Stamford Mountains northward—the only region in the highlands where granite exists. It lies broken in twain,—the larger portion having slipped ahead about four feet beyond the other portion—between which trees now flourish.

A week spent exploring the region about the Hoosac Tunnel Mountain is worth while for the student of Nature and her phenomena as well as for the poet and philosopher who cannot behold the flinty pyramidical piles ot rock tunneled from its heart without awe and reverence for the art and science of man which rendered the tunnel possible. Who can tell us how many centuries will roll by ere these monuments of the infernal regions will be covered with grasses, flowers and forest trees?

The rolling hills between West Shaft and Aurora's Lake are wild and rugged with out-cropping ledges adorned with briars and low huckleberry bushes, columbine, lilies, common polypody and various other ferns. In the openings among the pines the sward is carpeted with violets, making the pastures as verdant as those of fabled Ionia.

Westward the path winds through the fragrant pines, until one reaches the pretty mountain lake—so long called Fish Pond. It, having silently pleaded for a more suitable name, was christened Aurora's Lake by the writer in April, 1904.

The swamp-like pockets surrounding this lake are fed by springs and streams which once supplied that early lake of dawn. Above these slowly drained marshes are acres of boggy pasture land, blue with innocence, dog's tooth lilies, iris and shrubs of lamb-kill. Everywhere violets bloom—such violets as only Old Highland Berkshire can boast. Here is a rich field for him who would specialize upon this group of flowers.

In the slowly drained tamarack swamp north of the lake near the Pine Park an unfathomable area exists, where luxuriant piles of sphagnum cover deeply buried stumps and logs. Here the pitcher-plant is at home and is seldom discovered by those wandering along the paths to the park beyond. High huckleberries and shad-bushes offer their blossoms and fruits unseen, and wither unknown to the neighboring cottagers. Along the north edges in the shades of pine the trailing arbutus lingers later than is usual in the woodman's clearing.

A small stream rises in the pastures on the Scully Farm above the lake, along which bluets and a few spring beauties, dog's tooth lilies, dwarf cornel and yellow, blue, white and varigated violets drape the fern fringed borders toward the heart of the swamp. Higher along the hillside clearings beneath the scattered chestnut and birch trees many pink moccasin-flowers and small round-leaved orchises dwell and in the ravines near, the yellow moccasin-flower blooms sparingly.

The swamp is encircled with pine and hemlock which completely hide the wild meadows of the interior from the rude gaze of passers by as they stroll over the hills. One indeed must be willing to wade through mud and dangerous mires and crawl through entangled vines if he would behold the fair Elysian fields of Great Pan's wonderland! Here the cowslip or marsh marigold and tall blue violets carpet these places ere yet the trees are clothed with tender leaves and soon after, about May 20th, the moccasin-flowers—one species after another—unfurl their dainty petals, conspicuous among which are the pink and large yellow species. A full month later the showy queen (*Cypripedium reginæ*) towers above the ferns and nods content with her own reflections in the sluggish pools bordered round with violets.

Many pipe-like wands of *Habenaria* sway among the sedges—Pan's own pipes indeed—upon which many woodland thrushes perch and sing their songs of June. Meanwhile the Dutchman's breeches and the anemone amid the wee small white violets are fading along the edges of the bog, and in the small hemlocks and spruces the robins are feeding their young and shrilly voicing their fear, and wishing strangers be gone!

The old pine and hemlock logs half buried in the mould crumble beneath our tread and bespeak another age and the dust-bloom of many primeval springs during the centuries since the ancient Lake of Aurora disappeared from these flinty pockets of the Hoosac. Over the wildman's fence along the western edge of the marsh, tangles of willow are sheltered among the pines making the seclusion complete. Beyond these the marsh buttercups, iris and dwarf cornel bloom. On the higher mounds the wintergreen vines, clintonia and wild strawberries flourish in peace. Far beyond on the higher ridges of the pastures the hawthorn bushes of genus *Cratægus* are massed with rifts of snowy, fragrant bloom, while bees, butterflies and nesting birds are flitting from bush to bush searching for their own. Nestled in the "hollow vale" at the base of Mount Adams on the north, the "Tunnel City" rears its tall chimney-piles, pouring forth the vile smoke of civilization which creeps over the highland summits to the outer world.

Southward from the brow of Aurora's Lake the Valley of Ashuilticook, the south branch of the Hoosac stretches far beyond the tall spired village of Adams to the giant hills about Cheshire Harbor and beyond. Numerous round glacial hills fill the intervening valley around which the sluggish stream meanders. On the right hand the battlements of Old Greylock's brotherhood rise heavenward. In the nearer woods and pastures a network of swamps lead down the hillsides to the river, where a few spikes of the purple-fringed orchises (*Habenaria psycodes*) bloom in July, and later in the autumn the ladies' tresses, stars-of-parnassus, and blue-fringed gentains make a sea waving with gorgeous colors.

Northward along the Mayunsook, the north branch of the Hoosac, one meets chasms where the waters from the Dome have made deep scars in the marble hills. The Natural Bridge along Hudson Brook attracts many tourists each year. This place known to Hawthorne as "The Cave" was a favorite resort for the prose-master during his visit to the Valley in 1838. Many walking ferns cling to the moss-grown ledges about the bridge and following northward along a pretty path leading through a pine forest, one ascends high hills beyond which a beautiful view spreads out on either hand. In the distance toward Stamford a tamarack swamp marks the haunts of the pitcher-plant and many species of *Cypripedium*. A superb view of the Greylock group spreads out towards the south and a sprinkling of boulders is apparent in the pastures everywhere.

One should not leave the head waters of the Hoosac before climbing about the Ragged Mountain and Notch Valley and thence to that lofty brotherhood of Greylock—constituting the State Park Reservation of Massachusetts. On the brow of Ragged Mountain near the city reservoir, a path turns to the left winding over the ridges through swamps which are rich in many early blooms.

The showy orchis especially loves to dwell along these rocky ravines. Above a spring on the right of the path a little glen leads up among the fern-clad hills where the orchis and a host of hepatica and wind-flowers huddle together with jack-in-the-pulpit and rare spikes of *Habenaria.* Over the distant ridges are swampy pockets where the large yellow moccasin-flowers hide, and near by beneath the spruces the pink moccasin-flowers blossom in select groups. On the hillsides above, the small round-leaved orchis stand as sentinel over all. There is an exquisite delight awaiting the explorer of these hills when he first beholds them.

At this season the ledges and clearings are ablaze with columbine, and masses of swamp apple blossoms (*Azalea nudiflora*).

The Ragged Mountain range consists of three or four prominent saw-tooth peaks and are the foot-hills of Greylock, beginning at the Limekilns near North Adams, where Hawthorne located the scene of his tale *Ethan Brand*, they extend southward to the New England Limekilns in Adams at the base of Greylock. These slopes, as steep as the roof of a house, are adorned with crags and perpendicular bluffs and are seldom if ever ascended, save by the crows and hawks. The tourists and the youths of the City choose the higher summits of Greylock's brotherhood, accessible by the smoother paths and thus the Ragged Mountains are neglected.

The highest peak, more than 2,500 feet above the sea level, was christened Mount Hawks, by Rev. Washington Gladden* in memory of Sergeant John Hawks, who with his twenty-two men held Fort Massachusetts against the fearful forces of the French and Indians. Mr. Everett has called the Hoosac Pass the Thermopylæ of New England. Indeed the verdant meadows at the base of Mount Greylock's brotherhood were scenes of the bravest fights recorded in our history and here have waved the flags of the English, French and Americans in their turn.

This region is the same that influenced and inspired Hawthorne and Thoreau between 1838 and 1846.

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*"From the Hub to the Hudson," 1870.

Hawthorne especially loved the seclusion of Notch Valley and the Bellows-Pipe, and often ascended these ragged hills to dream the summer hours away. Many of these "day dreams" together with the voices of the wild are interwoven among the rosy clouds and mountain echoes of his stories of "rough, broken, rugged, headlong Berkshire." It was his custom to ascend the Valley to Mount Hawks and Raven's Crag where, looking far southward, he might behold the giant outline of Monument Mountain immortalized by Bryant and later denominated by himself the "headless sphinx" in "Wonder Book." He usually descended the slopes of the southern Notch Valley to the old quaker Meeting-House and thence to the road near the South Village, where he would meet the Pittsfield and North Adams stage, and Platt "a friend of mine", as he called the driver, gave him a ride to his Whig Tavern in the North Village of Adams.

[TO BE CONCLUDED.]

AIR PLANTS.

BY DR. WILLIAM WHITMAN BAILEY.

JUDGING from questions often addressed to me, I fancy there is much misunderstanding as to what constitutes an air plant. Indeed, some even suppose that there is one plant in particular that bears the name. This is not the fact.

An air plant, speaking botanically, is one that derives its nourishment from the atmosphere. Usually such a plant is attached to some other vegetation, dead or alive, which it merely uses for a support. It may almost as well be perched on rocks, and often is so situated.

Science denominates plants of this habit—"*Epiphytes*" —that is, vegetables that live upon others. When this is said, however, parasitism is not meant to be implied. That is quite another thing and denotes theft, either open or clandestine.

Air plants are formed in various families, in no other way perhaps, at all related. Thus the orchids, bromeliads, and even the Ericaceæ, show epiphyic members. The most beautiful epiphytes, without doubt, belong to the Orchidaceæ. Here we only see such in hot-houses. Our native orchids, such as the *Habenarias*, *Cypripediums*, ladies' tresses and tway-blade, are all terrestrial. Among humbler plants the lichens are epiphytic, but a lichen is a dual affair anyway—made up of alga and fungus. If it could speak it might tell us some queer stories of evolution.

But to return to our orchids, the epiphytic forms abound in the tropics—Borneo, Celebes, Java, Sumatra, Madagascar, Mauritius, the South American countries, Mexico, and the West India Islands. Our Phillipine possessions are full of them. Indeed, our colonies—Porto Rico, Guam, Samoa, etc.—offer a grand field for the ambitious explorer.

These orchids often make the forests glorious though the fact remains that tropical woods, as a rule, do not show any such fine masses of color, as we obtain in more temperate regions. The flowers are frequently well up aloft, as are the gorgeous butterflies who love them. They excel in fanciful forms and wealth, or even exaggeration, of color. Often they resemble insects or the smaller birds; we have seen pictures of some that looked for all the world like little imps. There is no harmony or contrast of color that they do not exhibit. Homely looking plants, often, and springing from spindle-shaped and ribbed pseudobulbs, all at once they burst forth into extravagant blossom. The flower of the Holy Ghost is an orchid. In it the true believer beholds the Spirit in the form of a dove descending to comfort and console. It was in Madagascar that Ellis found the strange *Angrœcum sesquipedale*, with a nectar-bearing tube nearly a foot long. When discovered entomologists foretold the existence of a moth with a proboscis equally long to fathom it. The accommodating insect soon after turned up. He had to; the two things were correlated!

One who has never visited a large conservatory filled with these exquisite plants, can give no idea of their transcendent beauty. Next to seeing the plants themselves, and every one who gets a chance should do so, the best thing is to consult the elegant plates in Bateman, Hooker, and some other of the great writers on orchids.

The bromeliads or plants of the pine-apple family are only second in beauty to the orchids. Our sole American representative, except in Florida and the Gulf States, is the so-called "long" or "Spanish moss," *Tillandsia usneoides*. This is a good instance of an epiphyte—but not a representative of the beauty of its really fine family.

According to Hooker, in the Himalayas certain rhododendrons assume an epiphytic habit. This shows that the trick is due more to environment and circumstance than to any degree of relationship.

Brown University, Providence, R. I.

THE RISE AND FALL OF THE TUMBLEWEEDS.

BY WALTER ALBION SQUIRES.

FOR the early settlers of our prairie states, the name "tumbleweed" will need no explanation. During the years when the prairies were being settled and brought under cultivation these weeds formed one of the characteristic features of the plains. One of my earliest recollections is that of standing at a window watching the tumbleweeds as the strong north winds, sweeping over the brown grass as only a prairie wind can blow, drove them along the distant stretches of the prairies. In those days there were few obstacles to obstruct their course, and as soon as the strong autumnal winds began to blow, collecting in unnumbered thousands from miles and miles of newly broken sod, they began their rolling, tumbling flight.

The tumbleweeds (*Amarantus albus* and *A. blitoides*) are doubtless indigenous to our Western States, and as introduced weeds they are probably to be found in every State of the Union, but they are nowhere so abundant as they once were and in many of the Prairie States where they were once the predominant weed they have sunk to a position of comparative insignificance. What were the causes which led to their sudden rise to a position of prominence and as sudden decline we may not be able to tell. We can only point out a few of the probable factors. Being annuals and requiring plenty of room to grow they were easily kept down and all but crowded out of their prairie homes by other and hardier plants. They must grow and reproduce their kind as best they can under the relentless sway of the world wide domination of the grass family. Where passing hoofs had trampled out the sod or some burrowing animal had thrown out a mound of earth they found root and grew for a season or two till the grass came back to reclaim its own.

Through ages of this "struggle for existence" they doubtless developed their rolling habit and came to produce a great number of seeds—seeds of such a remarkable vitality that they could lay ungerminated for years and bide their time. The result was that when the revolution wrought by the breaking plow came to the prairies the tumbleweeds of all the prairie plants were best fitted to profit by the overthrow of the grass dynasty. Seeds which had lain for years among the grass roots sprang up and grew into plants of unprecedented size. The soddy surface rich with decaying grass roots seemed exactly suited to their needs and there was room in plenty.

Like barbarian hordes seeking new homes in a crumbling Roman Empire these weeds began to push out into places where they had never grown before. In vast wind-driven armies they began to push out to all points of the compass, each year widening the area of their realm as though they had dreamed of universal dominion. Crossing the Mississippi they encircled the Great Lakes, climbed the slopes of the Appalachians and reached the Atlantic sea board.

But ere they reached the sea they had plainly had their day. The older soil seemed less suited to them and they did not endure cultivation well. Besides they now no longer had things all their own way. In the Eastern

States they met a westward-moving horde of introduced weeds,—weeds so hardened by centuries of struggle against man's dominion that the tumbleweeds stood little show of gaining a permanent foothold among them.

Even on the plains the tumbleweeds no longer have the chance they once had. There are few places where extensive breaking of the native sod is now being done. Even where it is still being carried on the sod is much more frequently prepared for a crop the first year than formerly, and though it be left vacant the tumbleweeds must fight for a foothold with many varieties of introduced weeds. Where they once swept for miles over the plains they are now almost certain to make only a pitiful little run of a hundred yards or so only to be brought up by a hedge row, fence, grove, or cornfield, there in an uncongenial spot to drop those thousands of seeds intended to be scattered afar across the prairies.

There are probably only a few of the ecological factors which have influenced the rise and fall of the tumbleweeds. Plant species like men and notions have their periods of development, their little day of power, and then their swift decline. Ferns, scouring rushes and club-mosses grow in bogs and swamps in dark and shady places and in crevices of naked rocks, and yet their ancestors once dominated and clothed with thick forest large areas of the earth's surface. Could we but tell the whole of the life story of these plants or even the complete story of the humble tumbleweeds, might it not rival in interest and wonder the story of the rise and fall of Persia, Thebes or Macedon?

Kooskia, Idaho.

SOME PLANT MYTHS.

Superstition is about the last thing the human animal gets out of his system in progressing from ignorance to enlightenment. Although he may discard its grosser forms, he continues to cling to a belief in charms, signs and miracles and gives them up unwillingly. The thriving business that is still being carried on by astrologers and other fortune-tellers, dealers in dip-needles for finding treasure, and workers of various other games that depend for their success upon a credulous public, are proofs of this assertion. The realms of Nature have always furnished the monger of sensations with a free field for the play of his imagination. From excursions into these regions he has returned with the sea-serpent, the unicorn, the roć, the barnacle-goose that grows on trees, the man-eating tree, the upas tree and a vast number of other equally entertaining and untruthful creations. One after another science has killed these off, but "newspaper science," the product of fledgeling reporters who would not know true science if they met it squarely in the way, is ever ready with new and equally wonderful stories to tickle our credulity. Nature is full of wonders, but the wonders of the reporter's imagination so far outstrip the wonders of nature, that as a people, we still prefer the reporter's version. The best selling popular science is that in which animals think, act and often talk, exactly like human beings, and in which plants are endowed with instincts that properly belong to animals alone. Instances are so abundant in the lay press that scientific publications no longer take notice of them, but when a publication devoted to science publishes such stories for the truth, it is time someone pointed out their falsity. From the February number of *Floral Life*, a continuation of *Meehan's Monthly*, we clip the following:

DISCOVERING AN IRRIGATING ORCHID.

"Mr. Suverkrop, a naturalist, who has made many journeys in South America to enrich the Kew Gardens, near London, with new plants, reports the discovery of a remarkable plant belonging to the orchid family. The naturalist tells this story of his discovery: I was sitting one hot afternoon on the shore of a large lagoon in the neighborhood of the Rio de la Plata. I observed a number of leafless trees whose life had evidently been nearly absorbed by the growth of parasitic plants that hung upon their trunks. My attention was soon directed to a flat plant with a number of large leaves, in form like spear heads, arranged like a sunburst around the center. It was a plant I had never seen before.

It was nearly as flat as a platter, except that there was a growth from the center, a sort of hollow tube of small circumference which extended several feet to the water below, the end of the tube being about four inches beneath the surface. I investigated the tube more closely and found to my surprise that it was sucking up water! I could distinctly feel the inflow as I put my finger over the mouth of the tube. But my astonishment was unbounded a minute later when I saw the tube begin to roll up, the process continuing until the coil thus formed had reached the middle of the plant, where it came to rest."

This note has appeared in many newspapers, and has been sent to us for verification. Of course, no botanist needs to be told that no such plant exists. In the May number *Floral Life* follows this story with several others as wonderful, from which we select some of the best.

THE NERVES OF PLANTS.

"According to an expert in the Botanic Gardens at Washington, recent experiments there tend to confirm the theory that plants are possessed of nerves, and that some species are irritable and nervous to a marked degree. The genus *Mimosa* comprises about two hundred species, and most of these exhibit peculiarly irritable natures if touched or handled in the wrong way. The *Mimosa pudica*, the botanical name of the most sensitive of all plants, is so highly organized that it is kept in a state of neurasthenia most of the time. A puff of wind, the tramping of heavy feet near it, or a rude touch of the hand will cause this plant literally to go into nervous hysterics. It appears that the exciting noise or commotion strikes the nerves of the plant and causes it to close up and droop its leaves. Hundreds of sensitive plants have been diagnosed in the Botanic gardens, and the observers of the plants have traced the nerve centers to their foundation. In certain of the plants the ends of the nerves have been located. Thus if *Mimosa pudica* is touched with ever so fine a point at the base of a pinna or along its axis, the most remote pair of leaves will shiver and begin to close. Finally, when all the leaves have closed, the pinna which has been touched will droop. The shock has been so great that the whole nervous system has been temporarily disarranged. However, like all nervous, irritable people, there is a point beyond which fright reacts and a control of the system begins to manifest itself. If the sensitive plant is shaken for some time it recovers from its attack of neurasthenia and some of the leaves will begin to open again. Finally, it is said that the most sensitive part of the plant is at the base of the secondary leaf stalks, where an immense number of nervous corpuscles or delicate tissues are located."

This case is surely one of neurasthenia, but to us it appears that the "nervous hysterics" have been charged up to the plant when they really should have been attributed to the "expert." Certainly "nerve" if not nerves is required to provide such an article.

A COUGHING PLANT.

"An interesting vine known as the coughing bean, is a respiratory plant which is a native of moist, tropical regions. By accidental transportation of its seeds it has gradually spread to much less congenial spots, especially railroad embankments, where it endures drought very well, though its growth is stunted. But there is one thing it cannot endure, and that is dust. When the breathing pores become choked by dust the gases accumulate within the leaf for a time and then are forcibly ejected in an audible paroxysm of coughing and sneezing, which makes the leaf tremble violently. At the same time the whole plant becomes red, owing to the subsiding of the green chlorophyll grains and the appearance of particles of red coloring matter on the surface. This odd vine is sometimes cultivated as a house plant. Sweeping the carpet of the room in which it lives is very apt to set the plant to coughing, much to the astonishment of persons unfamiliar with its peculiarities."

We would modestly suggest that that botanic garden "expert" be sent a specimen of this wonderful coughing plant. No doubt he could easily contrive a cough mixture that would cure it. Meanwhile, owners of the plant who find it getting red with prolonged coughing are neglecting their duty if they do not slap it on the back or tender it a cough-drop. If the "expert" has any decency about him, he will not attempt to treat this plant in the same house with the sensitive plant. Think what a case of "nerves" would be developed. No really sensitive plant could think of occupying the same bench with a stranger that is in the habit of coughing until it becomes red all over.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items.

MORE EXTINCT SPECIES.—In these days when any systematic botanist is inclined to stretch a point in order to include a new species in his list, it is refreshing to take up a publication like that of Dr. J. W. Blankinship's on the Flora of Montana in which the author has the good sense to see that no good can come from describing new species that do not exist. Although he is State Botanist of Montana he has deliberately disclaimed nearly a hundred species credited to the State by recent writers. Some are excluded because out of their known range, others because wrongly determined, and still others because in the opinion of the author they are mere forms of better known species. The systematic botany of the West seems to have become very much Rafinesquesque in the past few years.

THE DESCRIPTIONS OF FLOWERS.—One has only to consult the nearest manual to discover that the color-scheme of flowers is rarely described with exactness. The colors present are usually fairly well indicated but their arrangement and extent are but loosely described. Those who discover errors of this kind should make them known.

PÆONY OR PEONY.--The proper spelling of the genus to which this popular flower belongs is *Pæonia*. In our grandmother's day the common name of the plant was pronounced as if spelled pi-o-ny and by the uncultured this was soon corrupted to piny. Now-a-days we hear the plant spoken of as the "pe-o-ny" a most unwarranted perversion of the name. The diphthong æ in Latin is pronounced nearer the English i than any other and since the common name was derived from the scientific, those old-fashioned folks who continue to speak of the piony are really nearer the mark than their critics who insist upon peony.

THE ROOT-TUBERCLE BACTERIA.—According to recent reports the bacteria that form tubercles on the roots of leguminous plants, from which the plants later are able to derive nitrogen, appear to belong to a single species named *Pseudomonas radicicola*. It is known, however, that certain species of legumes will not grow in soils from which their favorite bacteria are missing. For instance, alfalfa will not grow in soil that has only the clover bacteria, though it will grow in soils in which the sweet clover (*Melilotus*) bacteria are found. This peculiarity is explained by the statement that while there is only one species there are several distinct forms or races. It is also said that the slight differences between these races may be broken down by cultivation. Contrary to the opinion first held, it is now believed that the association between leguminous plants and bacteria is not a case of symbiosis, but that the bacteria are rather in the nature of parasites. They are of benefit to the plants, however, in that by the death and decay of their bodies, the plant is able to obtain nitrogen.

A Water-storing Plant.—The various species of cactus and many other fleshy or succulent plants store up more or less water in their tissues for use in dry seasons. A plant from the island of Guam, mentioned by W. E. Safford, seems to have solved the same problem in another way. This plant is an epiphyte and is known as *Dischidia puberula*. Some of its fleshy leaves are modified into urn-like receptacles. These usually contain water and the adventitious roots from the stem often creep into them as if for nourishment or moisture. The water is probably not stored up for this purpose, but those who see adaptations in everything will doubtless make a very pretty story out of these facts.

Do Species Die of Old Age.—Individual plants as well as animals have their periods of youth, maturity and old age and when the destructive forces at length tear down the organism faster than it can be built up, death ensues. Species being mere aggregations of individuals might seem, at first glance, to follow the same rule, but this is by no means proven although evidence that they do so has been offered. That the answer to this question has a very practical bearing upon every day life may be seen in the case of the potato. Recently British growers of the potato have raised the cry that many of the principal varieties are dying out. If this is true, some other food plant will have to be selected to take its place. According to the new origin of species, evolution is constantly going on and new species originating. In this event there would come a time, theoretically, when any species may have to give way to a stronger one. We are all able to recall species that appear to be dying out, and this appears to be due to gradual changes in its surroundings, but when man cultivates a species and protects it from its enemies there appears to be no reason why it should ever die out.

Editorial.

During the summer vacation the editor spends part of his time at Binghamton putting things in order for another year's publications. If any subscriber has not received his due during the past year, he wishes to make it right. If your file of the magazine lacks any numbers, now is the time to let us know; they will be sent free. It is impossible for us to see every copy sent out and if by chance you have received spoiled or soiled copies we want to replace them. Our interest extends further than the mere sending of a dozen numbers for a dollar. The great bulk of our subscribers have full sets. Many of them have helped make the magazine, by articles, notes and suggestions by letter, so that it is about as much our subscribers' magazine as it is our own. This is why we want them to have clean and complete sets. Very soon these first volumes will be no longer obtainable and then they will find themselves in possession of something that will grow more desirable with each year.

⁂

Indexes to the first four volumes of this journal have now been issued and will be mailed free to all owners of these volumes upon request. The other indexes will be issued as fast as possible. It is our intention to issue an index to the volume just completed, some time this summer and in the future to index the volumes as completed so that no time may be lost in binding. We are glad to note that a large number of our subscribers are binding their copies. This is a good idea, for the vast amount of facts about plants that they contain will make them as valuable as an encyclopedia for all time.

⁂

According to the newspapers the Cornell forestry case has just been decided against that institution. In 1898 the New York Legislature appropriated $500,000 for the purpose of conducting experiments in forestry under the supervision of Cornell University. It is charged that the University at once purchased thirty thousand acres of forest in the Adirondacks and began cutting the timber from it. Most people understand forestry to mean conservation and not destruction of the forests and a protest by those interested in preserving the Adirondack forests resulted. It is alleged that the University was induced to lumber the tract by a forestry expert to the end that a new forest might be planted. It is just such "expert" advice that brings scientific knowledge into disrepute. It will not go down with the hard-headed practical people that form the bulk of every community. No matter how wise in book-lore a man may be if he does not supplement his learning with common sense he cannot expect to gain the confidence of the public.

⁂

Within the past few months there has been a tendency among the big magazines to increase their price. Several of the dollar magazines now charge for single copies at the rate of nearly two dollars a year. This will certainly result in greater popularity for the small scientific magazines. At present it is nearly impossible to convince the ordinary botanical reader that he is not paying too much for his scientific reading. He compares the number of pages with the number in the big magazines as if mere number is everything, and utterly overlooks the fact that twenty-four pages of one may give more information of the kind he wants than a thousand of the other. A rise in price by the big magazines must draw attention to the actual cheapness of the others.

BOOKS AND WRITERS.

"Ferns and How to Grow Them" is the title of a volume in preparation by Doubleday, Page & Co. The same company have recently issued "Our Native Orchids" by William Hamilton Gibson and Helena Leeming Jelliffe. This is said to be based upon an unpublished work left by Gibson at his death.

The Gardening World, of London, England, has added several new headings to its columns and in other ways brought its typographical appearance up to date. Its contents need no such improvement. We consider it one of the best and most practical gardening publications that reach us from "the other side."

The Montana Agricultural College has established a publication known as "Science Studies." The first three numbers have to do with the flora of the State. In the third number an alphabetical list of the common names of Montana plants is given, followed by a similar list of scientific names with the common names added.

Doubleday, Page & Co. have recently launched the "Nature Club of America," and hope to establish branches throughout the country. The society is apparently designed as a "feeder" for the set of nature books issued by this firm but the programs for the study of plants and animals are free to all who apply and will doubtless interest all who are attracted to Nature.

W. S. Blatchley, State Geologist of Indiana, has sent us a copy of "A Nature-Wooing," issued some years ago, in which he recounts his adventures in the field during a winter spent in Florida. Mr. Blatchley is an accurate observer and a pleasing writer and his book is well worth a reading, especially by those who will visit or have visited the part of the world of which it treats.

The success of Dr. A. J. Grout's "Mosses with a Hand-lens" has led him to put out a second edition to which has been added the common hepatics or liverworts. Without doubt this is the best book for the beginner in the bryophytes ever issued in America. The characters by which the species can be identified are, as the title of the book indicates, such as may be made out with a simple lens. The liverworts have now been treated in the same manner. The book abounds in good illustrations which supplement an excellent text carefully and lucidly written. (New York, The O. T. Louis Co., $1.75.)

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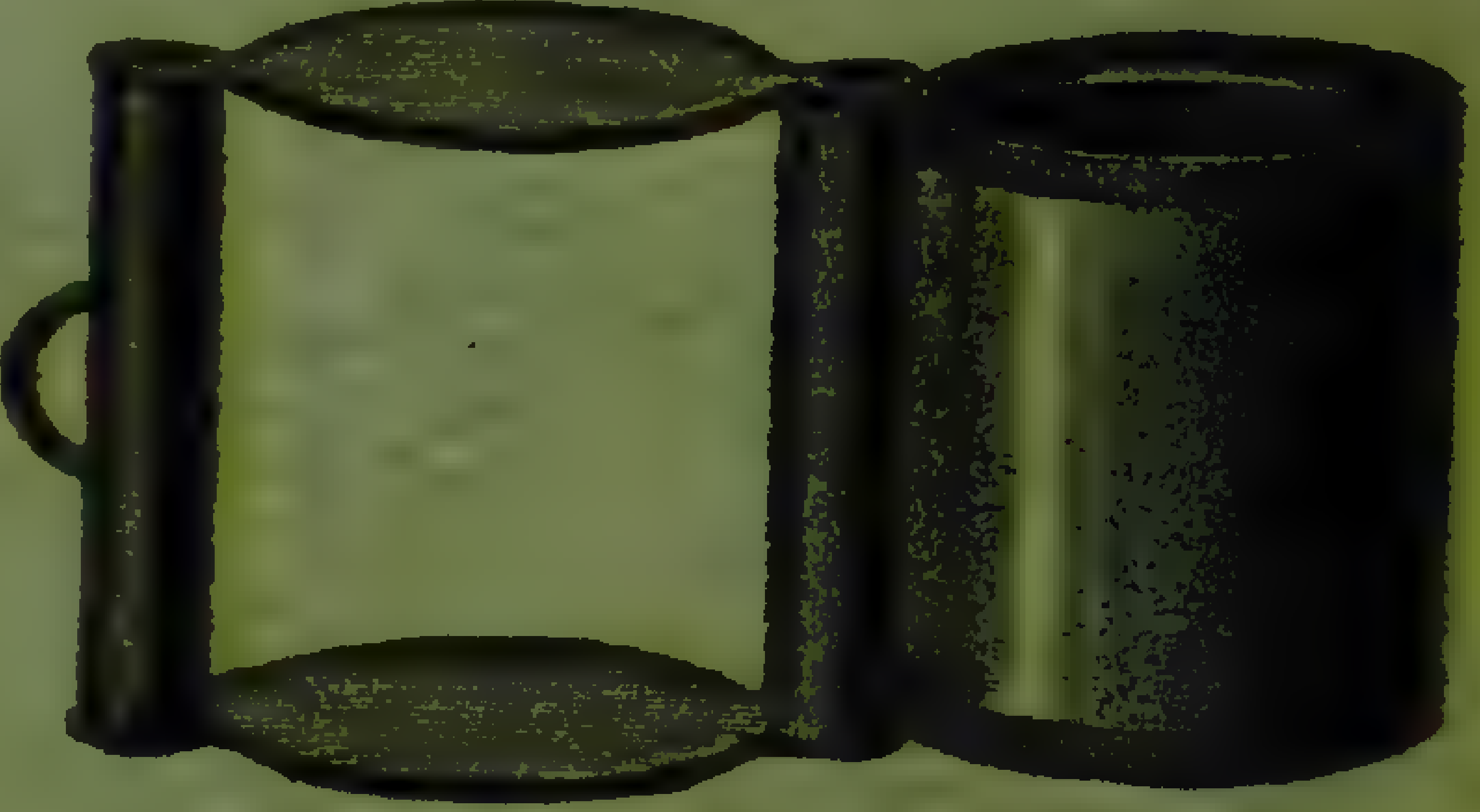

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In this department we shall, from time to time, recommend books that to us seem of special value to readers of this journal.

IV.—Fern Pamphlets.

There is a good deal of literature relating to ferns that is bound in pamphlet form. Students of the fernworts should have the following: "Papers presented at the Boston Fern Meeting (by Davenport, Grout, Fleming, Clute, Gilbert, Eaton and Britton) 25 cents. "Fernwort Papers" (by Eaton, Underwood, Slosson, Gilbert and Maxon), 25 cents. In these two pamphlets are to be found descriptions of several new species and many notes on rare fernworts. "Ferns of Nicaragua" 50 cents, the only publication on the ferns of this region. Gilbert's "North American Pteridophytes" 25 cents, is a list of the ferns and fern allies of North America. Clute's "Ferns of the Upper Susquehanna" 10 cents, is a list of species with notes. "The Index to first ten volumes of The Fern Bulletin," 25 cents, contains several thousand references to ferns and fern allies. We will send a set of the above for $1.25. Some numbers are becoming scarce, order now.

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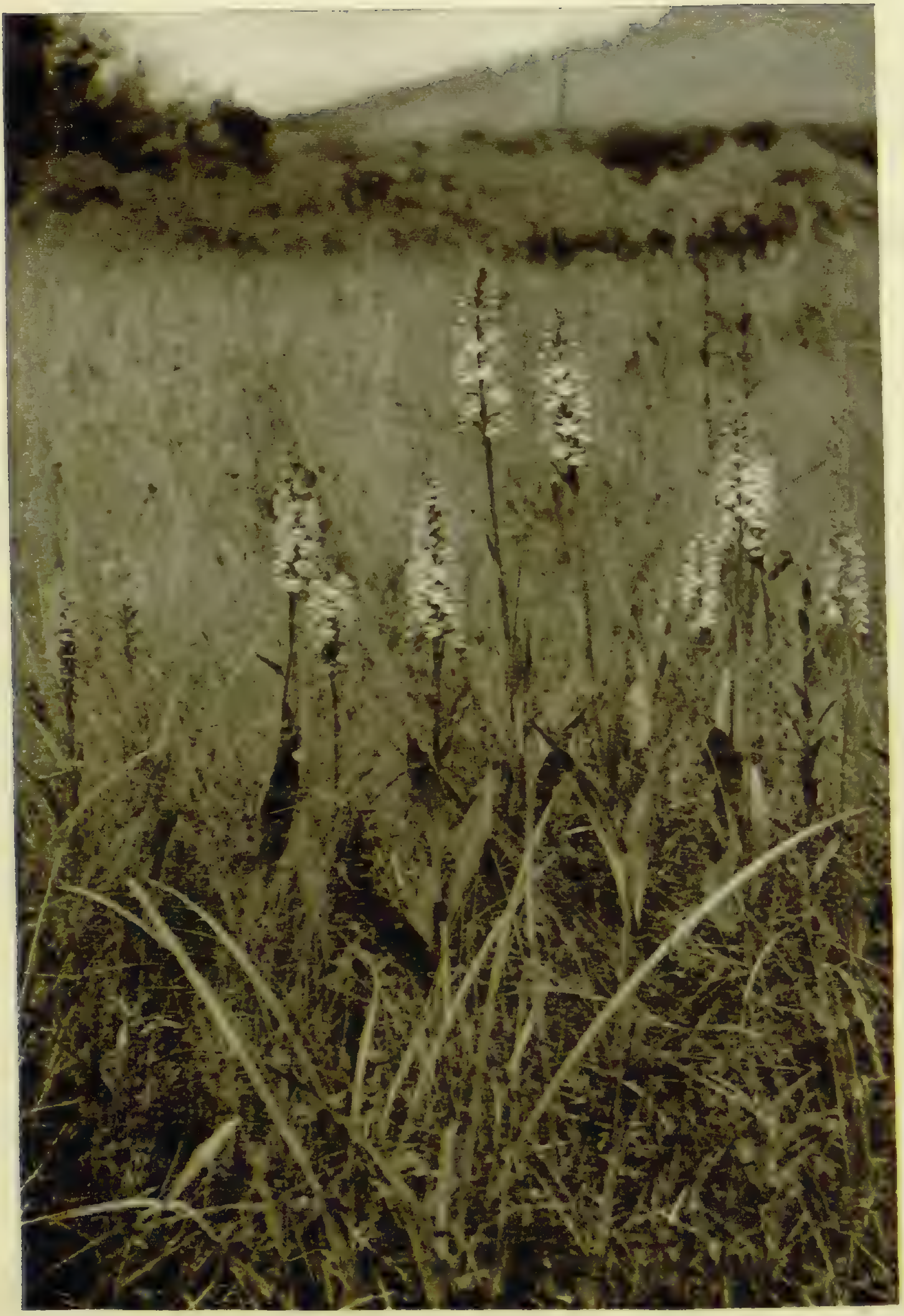


SMALL PURPLE-FRINGED ORCHID.

(Habenaria psycodes.)

THE AMERICAN BOTANIST.

Vol. IX. BINGHAMTON, N. Y., AUGUST, 1905. No. 2.

HOOSAC VALLEY AND ITS FLOWERS AND FERNS.

BY GRACE GREYLOCK NILES.

ILLUSTRATED BY KATHERINE LEWERS AND THE AUTHOR.

[CONCLUDED.]

ONE does not climb to the summit of Greylock to gather flowers, but rather as the philosopher Thoreau,* who restored his mind with memory scenes of grandeur and beauty. He says: "For I had come up here not for sympathy, or kindness, or society, but for novelty and adventure, and to see what nature had produced here." He speaks of the path up the spacious valley of the Bellows and continues that: "It seemed a road for the pilgrim to enter upon who would climb to the gates of Heaven."

It is not possible to wander with ease through the pathless forest of this primeval brotherhood of peaks, and old bruin and his mates are forced to follow beaten trails through Wilbur's Park, to the Inner Hopper region and Bald Mountain beyond. I cannot imagine a more pleasureable or instructive holiday than a month spent exploring the deep recesses of the Greylock group, during June and July. A study of the alpine blossoms compared with the flowers of the lowlands, might suggest more poetry and philosophy than is commonly suspected.

There are several approaches to the summit of Greylock and one should become familiar with all these trails in order to fully appreciate the grandeur of the mountains.

---

*H. D. Thoreau, *Tuesday*, "Week on the Concord and the Merrimac Rivers."

which extend six miles from east to west. An ascent by way of the Cheshire Harbor trail is the most gradual, yet at best it is a tedious, weary, meandering path to be traveled before one arrives at the Divide, and the Lanesboro-Pittsfield Road, a mile from the summit. No one should leave the great hill until he has dipped down into the fearful abyss of the Hopper and the inner heart of Greylock. It would be wise to pitch a tent on the Alpine Club's camping ground about the wild grassy meadows of Bald Mountain, and leisurely explore the Cascades of Money Brook as they leap toward the deep chasm of the Hopper.

From whatever source of Nature the mind may derive its store of beautiful scenes and happy memories the supply is sufficient for all time, and life cannot seem a failure to him who comrades with the mountains and listens to their inspiring voices. He who has rested upon the brow of Bald Mountain can still hear in memory the distant soft rushings and louder gushings of the Cascades as from the shaggy brows of Greylock they leap down—down into the heart of the abyss, a thousand feet below at the giant's base.

The Hopper region is girded with rugged heights, appearing much like a miller's hopper. Soon now the early morning mists dissolve from the brotherhood, and the sun beams over the shoulders of Mounts Williams, Fitch and Greylock, and kisses the bold forms of Prospect and Bald Mountains. The whole world seems beautiful in its new birth as the distant blue peaks of the Green and White Mountains roll off, one wave after the other like mist-billows on an atmospheric sea!

There is a trail of easy gradation leading from the College town of Williamstown through the Hopper. It winds around the north slope of Bald Mountain through deep shades of spruce and finally leads to the wild meadows at the base of Greylock near the camp grounds of the Alpine Club. Keeping to the left corner of this field one finds a path leading slightly to the right for a quarter of a mile to the Lanesboro-Pittsfield Road and thence two miles more to the summit. At the junction of the paths at the Divide, the roads branch from either hand and encircle the crown of Greylock. It does not make much difference which path one takes from this point except that the right hand road, which is walled about, affords the more extensive view. Along this road one meets signs pointing to the path to The Slide. This is not an easy descent as the stairs are steep and of unusual height and there is no rail to aid one in the climb. Many students, however, make the ascent by way of this trail. Nature herself set this path by means of a cloud burst that began near the summit widening as it loosened the soil from the bed-rock in its rapid descent to the valley, covering the farms in the vicinity with troublesome rock and logs. Farther on a path turns off to the right leading down to Bellows-Pipe coming out on the very ridge of pastureland in the extreme portion of Notch Valley. This is the trail beloved by Thoreau, which he took when leaving the Wilbur Farm on his route to Greylock.

The North Adams Road is the most gradual of descent of all the drives to Greylock Park and winds adown the brow of Mount Fitch above the inner heart of Greylock, until it passes through dense forests of black spruce to the clearings of Wilbur Park where a trail may be found which leads westward to the highest peak of Mount Prospect. President Hitchcock once said of this prospect "We came to the steep margin of the mountain, and in a moment the beautiful valley and village of Williamstown burst like a bright vision upon the eye. . . . . I have rarely, if ever experienced such a pleasing change from the emotion of beauty to that of sublimity as at this spot."

Continuing the descent one winds around the base of Mount Williams through the pastures to Walden's farm —and for him who walks it is most direct to the City— following near the borders of Notch Brook, through Snuff Hollow or Crow's Nest. This stream, however, soon enters deep ravines where numerous cascades play over great ledges down to the Hoosac. The chasm is very irregular and overhanging the banks, a great profusion of common polypody ferns cling together with frequent plants of maiden-hair spleenwort and walking ferns. Leaving the Highlands by way of this stream one follows the river northward through broad terraced meadows on the Harrison flats near the site of old Fort Massachusetts. The serpentine windings of these peaceful waters add impetus to the current.

The terraces of that ancient Lake of Aurora are still discernible everywhere about the valley and as the stream approaches the narrow pass just beyond the State Line it crowds hard against the rocky hillsides, scarcely leaving a safe passage for the roadway.

An interesting ledge of rock is formed along the Dug-Away at this place, known locally as the "Weeping Rocks." They consist of enormous shelving, pudding-stones covered with moss hanging in the form of stalactites, from which water trickles. These rocks are of calciferous, conglomerate and sandstone formation, and the cement or calcareous matter is being constantly derived from the slowly flowing water from these limestone hills. This cements together the small boulders and sandstone in such a manner as to amass enormous rocks that dynamite has little power over, since no drill could be used advantogeously to blast them.

An Indian legend is associated with these "Weeping Rocks." In this region a powerful tribe of Indians once sought refuge from the persecution of their enemies. Among them had been handed down a tradition that they should never be totally conquered and would endure till *the rocks wept.* Upon observing these rocks, however, terror and apparent fulfillment of the fatal prediction overwhelmed them with despair. A son of Williams College early commemorates the legend in part:*

---

* Williams Quarterly.

"Yet never they raised an impious hand,
The fates had spoken—their word must stand—
Here mourn the rocks a Nation's woe,
And tear-drops from the mountain flow.

Silent they fall at their chieftain's side,
And Hoosac blushed with the purple tide
Not a groan was heard, not a tear was shed,
But the rocks bewailed a Nation's dead."

Rattlesnake Brook, a picturesque stream rising in a decadent pine and hemlock swamp on Mount Œta, above the "Weeping Rocks" of Dug-Away, meets the river near the State Line. Many rare flowers dwell among the hills and vales in this region. The grandest pastoral views of the Highlands are visible from our modern Mount Œta, especially in the early morning when the valley about Williamstown is filled with billowy seas of mist which strangely suggest those ancient lakes of Aurora as they rippled to the Hudson.

The valley about Pownal is much like a deep secluded glen, surrounded on all sides by rolling hills and ledges which would be creditable mountains if there were not higher summits of the Taconics looming beyond them. The Bogs of Etchowog lying at the base of the Dome in the eastern part of the town extend toward Bennington—a distance of six miles. The floor of this swamp area is fed by sluggish streams meandering through a chain of decadent lakes, now being overgrown with sphagnum, in which cranberry vines, Labrador tea, small tamarack, pitcher-plants, various orchids, lilies and marsh plants flourish.

The purple-fringed orchises choose for their habitat the wild meadows bordering mountain lakes, or shady margins of sluggish streams. These orchids are among the most fragrant and beautiful *Habenarias*, although one may search long before he discovers their secret homes. In many places the mountain laurel is embanked against the mountainsides and flaunts the most gorgeous colors imaginable. That Americans do not cultivate these flowering shrubs instead of the foreign species is inexplicable.

One more marsh—the Swamp of Oracles claims notice before descending again to the deeper valley. It is in this region that all of our New England *Cypripediums* bloom. From about the 15th to the 25th of May the rare ram's-head moccasin-flower of this genus unfolds its dainty dull purple slippers under the pines along the rocky borders of the swamp. This is the most southern station reported for Vermont, and is at this date the only town in the Hoosac Valley where this *Cypripedium* dwells. The most southern station for this species existing in New England is Mount Toby in Massachusetts.

Eastward in the marsh the pink moccasin-flower and her two yellow sisters—*Cypripedium hirsutum* and *Cypripedium parviflorum*—are unlacing their golden shoes. Later the showy queen (*Cypripedium reginæ*) is abundant in many swamp areas in the region, though it is freely collected by school children and lovers of Nature. The haunts of our flowers and ferns should be known in order that their beauty be appreciated, yet a public conscience should be created and exercised in their protection.

The rarer ferns of the Hoosac climb over the dangerous Gregor Rocks east of the village of North Pownal. These bluffs of limestone are probably the remaining portion of a ledge which at one time spanned the valley. Their summits reveal scars of great volumes of water eroding them from the east, doubtless the overflow of the large Lake of Aurora which was located between Mount Anthony and the Dome.

The first settlements in the valley were made by the Dutch in 1724. No record of them remain save the names of the places which they occupied. Gregor Rocks were owned by Gregor who settled a little north of these cliffs. His wife was considered extraordinarily intelligent by her neighbors and for this reason was accused and tried as a witch.

These marble bluffs are festooned with ferns, and no one can pass through the town without beholding with wonder the great cliffs towering above the narrow valley. One must encounter many difficulties before he beholds the rare flowers and ferns of these hills and yet the view is sufficient to repay one for the climb. The hills are clothed with cedars, oaks, birch and various other trees, and if one carefully observes the crevices of the boulders he will find the rarest of our ferns—the rue-in-the-wall and its comrade, the purple-stemmed cliff-brake—clinging in these fissures. In 1578 the rue-in-the-wall was known to grow on moist old cathedral walls in England and Germany. These ferns do not resemble the ordinary species, familiar to country folk and few recognize them as members of the Fern Family. The walking ferns also dwell along the bluffs and are abundant along Wash-Tub Brook and Pownal Centre Road.

On the brow of Gregor Rocks the snowberry (*Symphoricarpus racemosus*) grows, and in the autumn is laden with bright white berries. This is the only station known to the writer for these shrubs. They belong to the Southern and Western States, and this haunt is worth noting. A station has also been reported for these species on similar limerock bluffs on Mallett's Head, Isle La Motte in Colchester, Lake Champlain region. Stray plants of the coral-root (*Corallorhiza*) also grow along the cow paths leading over the rocks, and the blue bells of New England everywhere adorn the ledges and open pastures among the cedars.

Nabbie's Leap is located at a point on the very brow of the rocks where a foolish girl named Nabbie Ross made a dangerous leap and was caught in the top of a cedar tree and thus buoyed up until the villagers with the aid of ropes came and lowered her safely to the bottom of the cliff, a distance of nearly ninety feet.

During August and September the red wood lily towers along the roadside hedges and borders the open woodland clearings. The autumn days march on with a wealth of golden-rod and asters, banked among the crimson sumac and pearly everlasting which breathes out a delicious fragrance. About the Bogs of Etchowog beyond Gregor Rock the ladies' tresses, the last orchid of the year, blooms amid the blue-fringed gentians, and creamy stars-of-parnassus, making the marsh a place of marvelous beauty.

THE PITCHER-PLANT INDOORS.

BY WALTER ALBION SQUIRES.

IT is probably not generally known that the pitcher plant (*Sarracenia purpurea*) can easily be raised indoors. Over a year ago I secured one of these plants from an eastern nursery. I planted it in a small pail, in a soil composed of sand mixed with the sphagnum moss in which it was packed when it came from the nursery. I had heard that they should be grown under a bell-glass, but not having anything of that kind, I placed a lantern globe over the plant. It began to grow at once and kept sending up new leaves all summer. These were mere sharp pointed cylindrical shoots at first, but before they were an inch long the well known pitcher form began to make itself manifest. A small notch appeared on the dorsal side near the tip of the shoot. This was finally to become the opening of the pitcher just below the hood. The leaves remained closed until they were nearly full-grown; the two sides of the hood being pressed close together. Then some morning on looking at the plant the leaf would be found wide open. Around the under side of the hood were many sharp pointed bristles all pointing downward; below these was a zone as smooth as glass, and the bottom of the pitcher was full of water; a veritable death trap for the flies and other small insects which came to taste the drops of clear nectar-like fluid which was sprinkled over the inner face of the hood. Many were the victims which went down over that smooth surface never to return.

Although our plant did not produce any flowers, it is safe to say that it attracted more attention than all the other house-plants together. After midsummer I placed it out of doors. It endured much neglect with dry and windy weather but kept on producing leaves all summer. It was placed in the cellar over winter and when taken out this spring began to grow as thriftily as ever.

The pitcher plants are among the most remarkable plants that our country produces. There seems to be no reason why they should not be often seen in the home collection and their presence in the school room would certainly lead to greatly increased interest and pleasure in the study of plant life.

Kooskia, Idaho.

A VISITING TEMPLAR.

BY DR. WILLIAM WHITMAN BAILEY.

A BEE flew in at my window laden with the sweets of summer. His costume was elegant and of a mediæval style. He wore a black velvet doublet, slashed with yellow, and altogether was a dignified traveller. He seemed bewildered in my apartment. After a while, becoming more familiar, he began an exploring tour. He looked into the vases and the water jars, he bumped his head against the mirror in vain attempt to perforate it; he read the title of my books, and narrowly escaped drowning in the wash-basin. When he came too near my head I remonstrated, and, like Rhoecus, drove him off. He carried consternation to the heart of the flies which were wheeling in the centre of the room. It was like the intrusion of a comet into their peaceful planetary system. When quite fatigued with his journeys, he would settle down in a remote corner and buzz like a hurdy-gurdy. He can tell a curious tale when he flits back to the woods.

I should like to know where he last came from, and how he happened in the depth of the City. Here we have no clover tops for him to dip into, no columbines upon which he can swing. A melancholy fuchsia in the window or a struggling geranium devoid of honey, is all that we give our visitor. From his costume, he is a Knight

Templar, but there are no brother Knights to welcome him. Did the little stranger live in the forest, sweet with birch and fern, or did he bore a hole beneath the seat of some portico to astonish or alarm the sitters?

Wherever he came from, this Mr. Bumble, it does one good to greet him. He brings in the perfume of the meadow flowers. I seem to see the broad fields of glowing buttercups, "the little children's dower," the daisies nodding their starry heads, and the dandelions offering their golden disks. I should like to have the fellow stay, but no, he must be off.

The persistent husbandman lays up in summer a surplus treasure for the rainy day. Old Bumble does the same. He thinks of the long winter, of the snows and storms, and must not loiter here. With a final whirr—which seems to affirm a new resolution—he dives through the open window and is lost in the blue of Heaven.

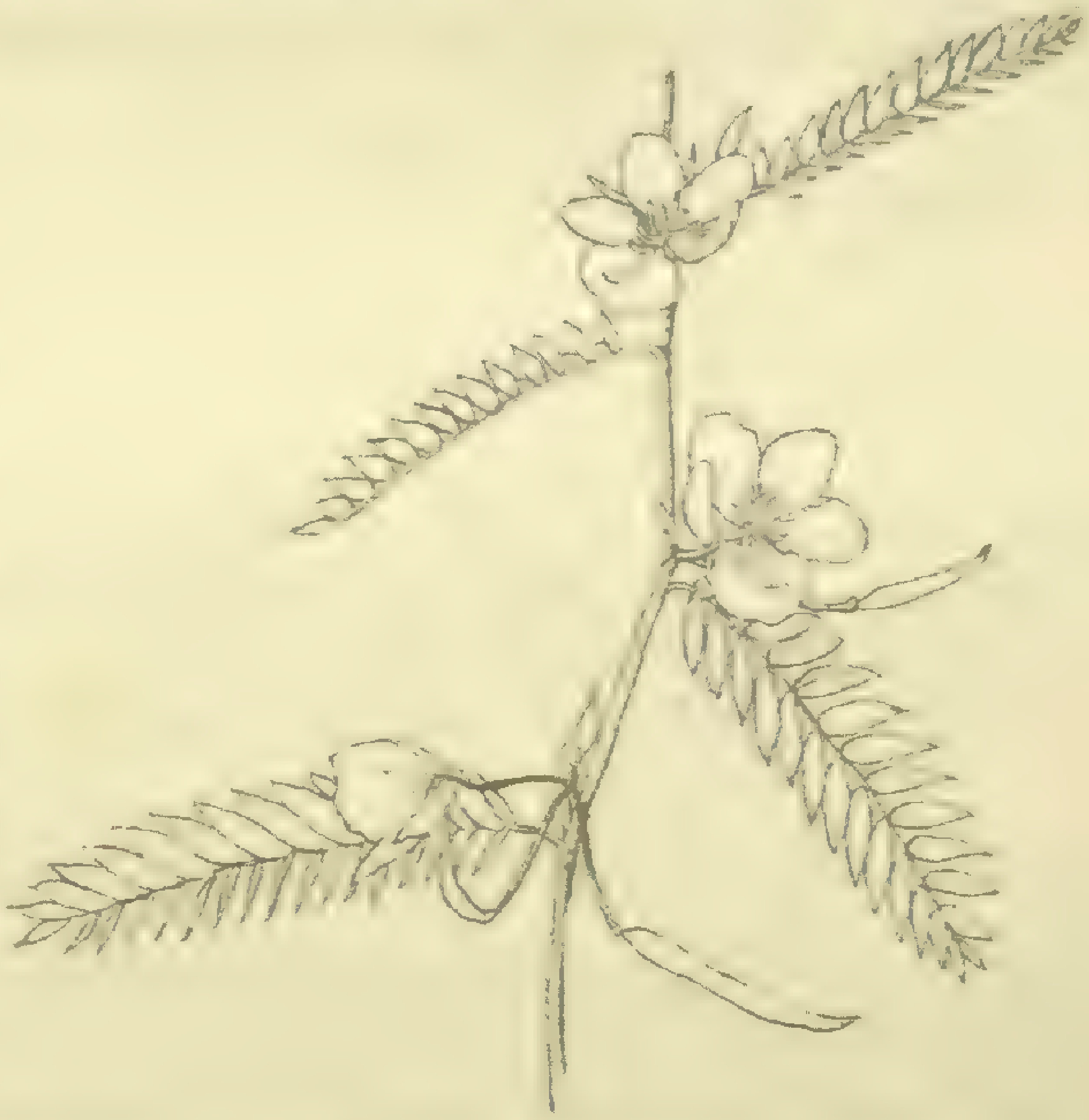
Brown University, Providence, R. I.

THE PARTRIDGE PEA.

BY WILLARD N. CLUTE.

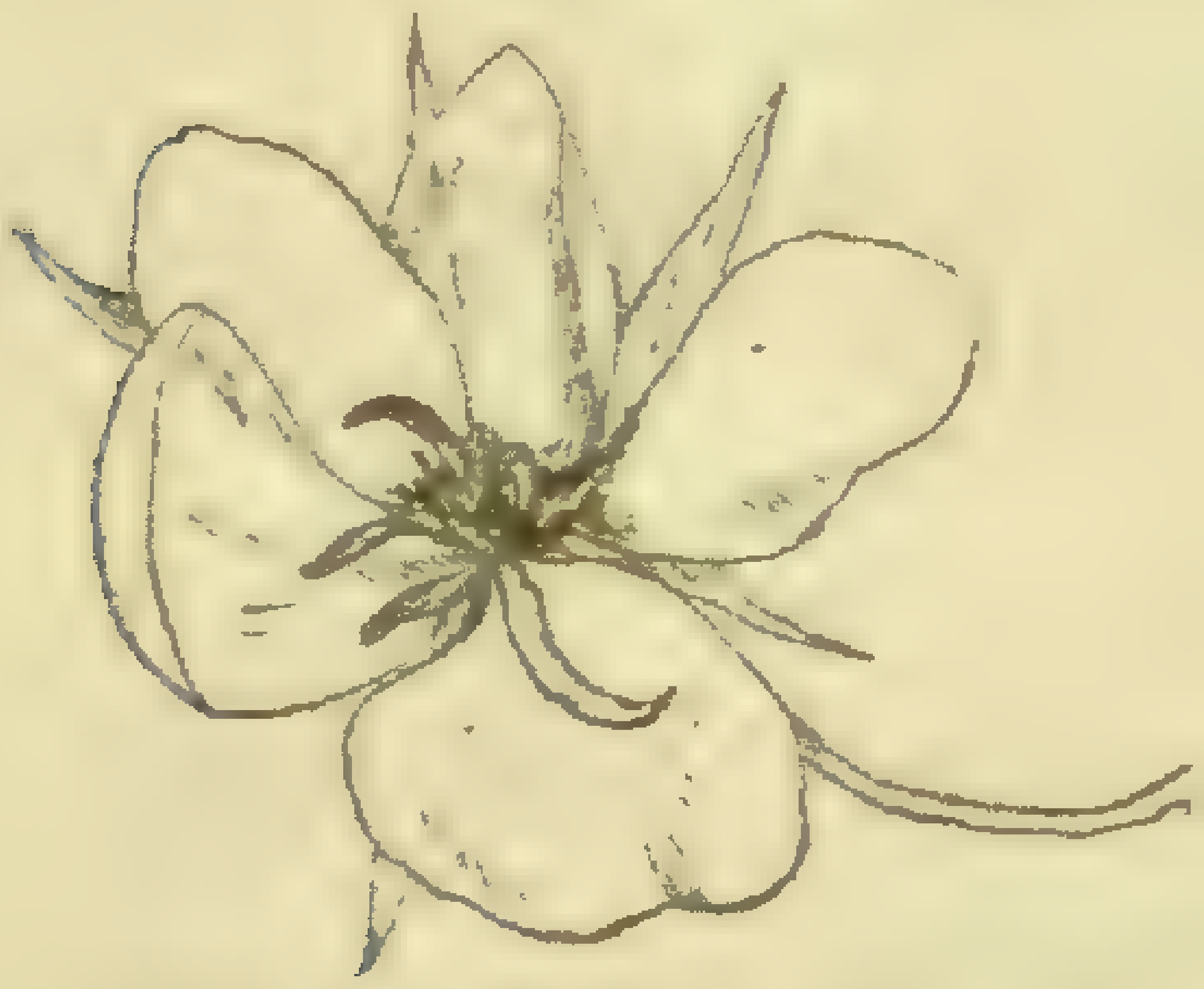
ONE of the commonest weeds in eastern America, where the soil is sterile and dry, is the little partridge pea (*Cassia chamæcrista*). It begins to bloom in the northern part of its range in early July and thereafter is never without flowers until the frost cuts it down. Like many another so-called weed, its reputation for weediness is due entirely to its abundance coupled with a lack of economic value. If one will examine it with an eye for its good points only, it will be found to fully equal in beauty many of the more pretentious exotics carefully cultivated in our gardens. Indeed, the plant is not infrequently planted for the sake of its graceful foliage and handsome yellow flowers in regions where it does not grow naturally.

Beauty, however, is not the partridge pea's only claim to attention. Its manner of coping with untoward conditions makes it one of the most interesting of plants. The soil in which it delights is usually sandy and deficient in nitrogen. To secure a proper supply of this necessary element, it has called to its aid certain bacteria that are able to obtain nitrogen from the air. These live in small nodules upon the roots of the plant. The nodules are conspicuous enough to be easily seen, but the bacteria, of course, require a good microscope for their inspection. This sort of a plant-partnership is known as "symbiosis" and has been found to exist among various other species of plants such as the clovers, heaths, etc.



The leaves of the partridge pea consist of about a dozen pairs of opposite, entire leaflets, and like those of the sensitive plant and various other members of the pea family, close at night and in stormy weather. They also imitate those of the sensitive plant by closing when touched, though with a much slower motion. On the stem of the leaf, just below the lowest pair of leaflets, is a curious lens-shaped gland about the size of a pin's head, with an opening in the center from which a sugary fluid constantly exuded. This gland has also been more or less of a puzzle to botanists. Some have conjectured that it is designed to provide food for ants in return for their protection, but this seems incorrect. The exudation is pleasing to ants and attracts numbers of those insects to the plant, but they do not seem to be of any special protection to it. The opinion is now gaining ground that the gland is simply of an excretory nature and was evolved without reference to insects of any kind. The leaves take up the crude materials from the sap and the air and manufacture products useful to the plant, the waste products being thrown off through the glands. If this happens to please the ants, it is so much their good fortune.

It is interesting to note how adroitly the partridge pea, with nearly regular flowers, manages to secure cross-pollination. In the majority of regular flowers, like the oxalis and buttercup, there is a sort of indiscriminate pollination and the styles may receive pollen in various ways. More than sixty different insects are known to visit the buttercup. By a very slight irregularity in the partridge pea's flowers, however, it has been enabled to direct visiting insects to the honey in such a way as to be most advantageous to the plant. This may be seen by a reference to the blossom. Four of the petals spread out flat, but the remaining one, a lateral petal is fashioned into shallow spoon-shape about the stamens, while the pistil extends downward across the broad lower petal. At the base of the two upper petals and the other lateral one there are spots of crimson showing the location of the nectar. The flower is hung sidewise like a pansy, and when an insect approaches it, the broad lower petal is obviously the easiest place upon which to alight. In doing this he is likely to brush pollen from another flower upon the stigma. Moving toward the crimson spots he begins gathering the nectar in doing which he is obliged to assume positions that bring his body into contact with the stamens and thus he is loaded with more pollen for another flower. The curved petal seems designed to prevent insects from entering the flower from that side and so passing first over the stamens. It is a singular fact in this connection that about half the flowers are thus right-handed and the rest left-handed—an excellent arrangement to ensure the proper transference of the pollen.



Binghamton, N. Y.

A WILD-FLOWER GARDEN.

BY MARY E. DOCKHAM.

BECAUSE I enjoy my wild-flower garden so much I would like to tell others about it. We have a fair-sized back yard for a city residence, and along by the fences I have transplanted roots from the woods and fields, at different times until I have quite a collection. It is surprising how many kinds can be grown in a back yard if one gives thought to *situations*. Let me enumerate my plants in the order of their blooming; blood-root, hepatica, wild ginger, mandrake, violets, meadow beauty, Solomon's seal (large and small), Jack-in-the-pulpit, wild oats, wild lily-of-the-valley, wild columbine, *Smilacina stellata*, *Corydalis glauca*, herb Robert, wild geranium, red and white baneberry, painted trillium, golden ragwort, sweet cicely, black-eyed Susan, false Solomon's seal, butter and eggs, aster, and golden rod.

I am a very busy woman and find little time for rambles in the lovely places of nature. My wild flowers are my dear friends, and I can greet each one as it comes, it takes so little time to run out into my back yard—no long trolley ride before reaching the woodland beauties. This spring twenty lovely blossoms opened their pure white petals on my blood-root. My bed of hepaticas, half a yard square, was a delight to the eyes. The wild lily-of-the-valley disappointed me by having few flowers, but the mass of shining leaves made a refreshing green spot to look upon. Last fall a friend sent me tubers of meadow beauty, which I planted with a little prayer, and I was more than delighted when they showed their exquisite faces this spring. The lovely wild columbines were quite abundant. My wild geranium, a large mass, was resplendent with its entire top covered with its delicate pink-purple showy flowers. Violets had cast their seeds far and wide, so the dear blue things were all through the grass. Only one yellow one deigned to bloom, and very few white ones. Jacks, both light green and the striped ones, are flourishing. Black-eyed Susan will arrive soon.

Asters and golden rod hold festival later. Buttercups were rather too numerous on our lawn, so I filled a space about a yard square with roots of them and all summer long there is a pretty show of their golden cups, as several varieties are among them. June 17 I brought home roots of yellow-eyed grass and so far they have borne transplanting nicely.

Not all wild flowers take kindly to a back yard, as for instance wind flower and houstonia. Treat them ever so tenderly they droop and die—homesick for their "very own place." I feel a little impatient with houstonia and want to say, "You go romping all over the fields. Why can't you brighten a little place in my yard?"

It is so easy to make a wild-flower garden, I do hope some of your readers will have one another season. Now is a good time to commence collecting. All that is necessary is to notice the conditions surrounding the plants as you dig them up, and give them as nearly the same in your yard as possible. I am associated with teachers and it gives me delight when I can furnish them specimens for school work, or when anyone asks about a flower to step out into my yard and show one.

I have several kinds of ferns, also. A beautiful maiden hair is under the shade of a tree. Polypody is at the edge of a concrete walk, as nearly a rock formation as I could find. Crested ferns, hay ferns, osmundas, and Christmas ferns are growing very well, though I can never hope for the luxuriant growth of the woods.

You who have children or younger brothers and sisters, what better way to remind them of holidays in the woods than by transplanting some of these plants into their grass plats at home?

Chelsea, Mass.

WHITE FLOWERS.—The bright white of flowers of this color is due principally to the fact that the tissues of the petals are filled with air. By immersing them in water the air is gradually driven out and the petals lose their white color and become nearly transparent.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items.

CLEISTOGAMOUS FLOWERS.—A student of cleistogamous flowers has recently announced that under certain conditions plants that usually produce open or chasmogamous flowers will produce the closed or cleistogamous ones. These latter are said to be due in many cases to poor soil, lack of certain mineral constituents or insufficient light. The editor of this journal long ago pointed out that the Canada violet annually goes through all the changes from showy flowers to cleistogamous ones and back again, in this case the changes being probably due to temperature.

LARGEST FLOWERS IN THE WORLD.—The flowers of the rafflesia (*R. Schadenbergiana*), expanding more than thirty inches, are easily the largest flowers in the world. If our measurements were merely from the tip of one petal to the tip of another, however, a South American orchid (*Cypripedium caudatum*) would lead, for the lateral petals, from which the plant gets its scientific name, grow to the enormous length of twenty-eight inches, according to Kerner. The same author states that one of the tropical aristolochias, with whose relatives, the Dutchman's pipe and Canada ginger, we are all familiar, often grows to be fifteen inches long and somewhat wider. Children use them for caps in play and are able to draw them down over their ears. The largest flower growing on a tree is said by Kerner to be a species of magnolia (*M. Campbelli*). The petals are bright red and spread nearly ten inches. Other large flowers are, the lotus, various water lilies, cacti, and the opium poppy, which reach diameters of from eight to fifteen inches.

PROGRESS OF PLANT PROTECTION.—The original Society for the Protecton of Native Plants has more than doubled its membership during the past year, and now has a mailing-list of nearly fifteen hundred members. Since the Society was organized it has issued 71,000 leaflets and nearly 30,000 other notices. This is a very good showing toward practical plant protection.

PUFF-BALL SYNONOMY.—In a recent publication by C. G. Lloyd, nearly three hundred names of puff-balls are given that in the author's judgement no longer apply to specimens of these plants. In the days when the puff-balls were only imperfectly known, many new species were described from insufficient material and having since turned out to be the same as better-known species, their names become synonyms. Other names in this list belong to the class of "juggled names" as the author calls them, in which authors, in the desire to get their own names after a species, have changed the plant from one genus to another with this end in view. Mr. Lloyd has gone a long way toward making puff-ball nomenclature stable.

AUTHOR CITATIONS IN BOTANY.—We are all familiar with the custom in modern botanical literature of printing the names of one or two botanists after the scientific name of each plant. These authors may be regarded as the plant's sponsors, and if botanists can be induced to always print the names in this way, those whose names appear in such connections have arrived at a cheap immortality. The time was when a single botanist's name after a species was sufficient, but when the possibilities of making new combinations of generic and specific names were realized there was a general rush for notoriety in this way until now every plant name that can be twisted into carrying a double load of name-tinkerers, has seemingly received attention. When two names appear after a species, the one in parenthesis is supposed to be that of the author who really described the species, and the other to be the one who placed it in its proper genus. Only those authors who were lucky enough to get their new species so securely anchored in the right genus as to be inseparable from it are safe from the indignity of being shut up in parenthesis by some later juggler of plant names. To slightly paraphase "Poor Richard," it may be said that these modern nomenclaturists are a superstitious lot, great observers of forms, dates and places of publication and they stick to their cabalistic signs with a pertinacity that shows that a great value is set upon this literary method of embalming. Notwithstanding the merits of this proceedure for all botanists who need embalming, there have always been a few writers to point out that just so long as this prize is held out to ambitious botanists, just so long will name-tinkerers labor to shut up other botanists in parenthesis and to parade their names before the public. It has, therefore, been proposed, as one of the surest ways of causing nomenclature to become fixed and unvarying, to remove this inducement to authors by refusing to print their names with the species. In other branches of natural science only the original describer of the species is printed, and it has been proposed in botany to leave off both authorities. In fact, this is already being done by the National Government in work intended for popular reading, and by some scientists notably Mr. C. G. Lloyd whose papers on fungi are always thus published. It may be added that in the eight volumes of THE AMERICAN BOTANIST thus far published we have not found it necessary to print the author-citations in order to be understood. Even at this late day there are undoubtedly cases in which new species must be published, but so much has been made of the fetich of "priority" that those who have contributed most to the upheaval in plant names have contributed least to real botany. When a botanist gets to the point when no subject appeals to him except a change in name, he should cease to lay claim to the title of botanist.

Editorial.

This is the last time we shall offer to supply, free, missing numbers of the first six volumes of this magazine. The demand for these numbers has about used up our supply and we cannot break the few sets remaining. To all our subscribers, therefore, we say, look over your first six volumes and see that all the numbers are present and in good condition. We will replace defective and missing numbers free if notice is sent us at once. If you wait until later, you may have to buy the entire volume to get a number you want.

⁂

We take considerable satisfaction in calling attention to the fact that this magazine is again issued on time. Owing to a press of business last winter some numbers were nearly sixty days late but we have caught up without doubling up on our numbers and with our subscribers' help we intend to come out on time in the future. And while we are on the subject we want to invite our readers to help us push the magazine a little more strenuously. If we can get a single hundred more subscribers we will add four more pages to each issue of this magazine. It is thus to every reader's advantage that the magazine prospers. Will you not help us? You do not need to hunt for botanists to secure subscribers. Anybody who loves the wildflowers ought to subscribe and doubtless will if the matter is properly presented to them.

⁂

Now that the Vienna botanical congress has adjourned it is only our respect for the feelings of the radical botanists that prevents our saying in large type "I told you so!" The official report has not yet got around to this office but we learn from private sources that the name-tinkerers did not have things much their own way. So far as the congress is concerned the nomenclature of the next few years bids fair to be of the same conservative nature as that which has always characterized the names used in this journal. One of the things that will bring delight to many is the statement that that abomination, a repetition of the generic name for the specific one, of which more than eighty have been proposed, is buried too deep to ever come to light again. *Apios apios* and *Sassafras sassafras sassafras* are gone forever. *Requiescat in Pace!*

⁂

We expect to issue indexes to the remaining four volumes of this magazine as soon as the printer can attend to the matter. If you bind your magazines you need the indexes. They may be had now for the asking.

⁂

The suggestion, made on another page that all who can should have a wild garden, is one worth the attention of every lover of plants. The popular mind frequently divides the vegetable kingdom into plants, flowers and weeds—plants being those we cultivate for food or ornament, flowers those we grow for their blossoms, and weeds the wild plants of the locality. It is incorrect, however, to assume that all our wild plants are weeds. Many of them are cultivated in flower-beds abroad, while all that we cultivate for their flowers are wild in some part of the world. In our own wild plants one may find a fruitful field for observation and study, and if they are planted about the house where we can visit them in spare moments we are likely to gain great pleasure from watching them grow for a single summer. The bulbous species are also among the early spring flowers and appear when there are few kinds of cultivated blossoms to be had. Plants dug up now will almost surely bloom next spring. Some of the most satisfactory are the bloodroot, hepatica, trillium, columbine, bane-berry, violets, Canada ginger, colt'sfoot, anemones, lupine, lilies, closed gentian, bellwort and butterfly weed. Almost any wild plant will thrive, however, if given a proper chance. If there are any plants you fancy, dig them up and plant them in the home grounds.

BOOKS AND WRITERS.

Mr. O. W. Barrett, whose contributions in this journal have interested many readers, has resigned his position as Entomologist and Botanist of the Porto Rico Experiment Station to accept the position of Plant Introducer of the United States Department of Agriculture with headquarters at Washington. He will have charge of the distribution of the tropical and sub-tropical plant stock as well as the inspection of incoming and outgoing shipment of such stock.

A curious little booklet that no doubt will prove most attractive to children interested in nature studies is "My Own Book of Three Flowers that Blossom in April and May" by Anna Botsford Comstock. The flowers selected are such common ones as hepatica, trillium and spring beauty. There is a photograph of each of the six plants considered, a conventional design suggested by the plant, two pages of popular descriptive text for each, two pages of questions for the child to answer about each flower, and in addition room for the child's own description of the plant and a water-color sketch. It is safe to say that the child that follows out the suggestions made in this book will add much to his knowledge of the plant. (New York, The American Book Co., 1904.)

In 1886 Professors Arthur, Barnes and Coulter issued a little book on "Plant Dissection" and this, revised and rewritten by Otis W. Caldwell has recently appeared under the title of "Plant Morphology." Essentially it is a series of directions for the study of the structure and methods of reproduction of a series of plants illustrating all the principal groups, beginning with algæ. For the most part the student is told what to observe and few questions are asked. At the beginning and end of each study is also more or less information or phases of the subject not easily observed in the laboratory. There is an unusually good glossary but the author's ideas of periodical botanical literature apparently need revising. (New York, Henry Holt & Co., 1904.)

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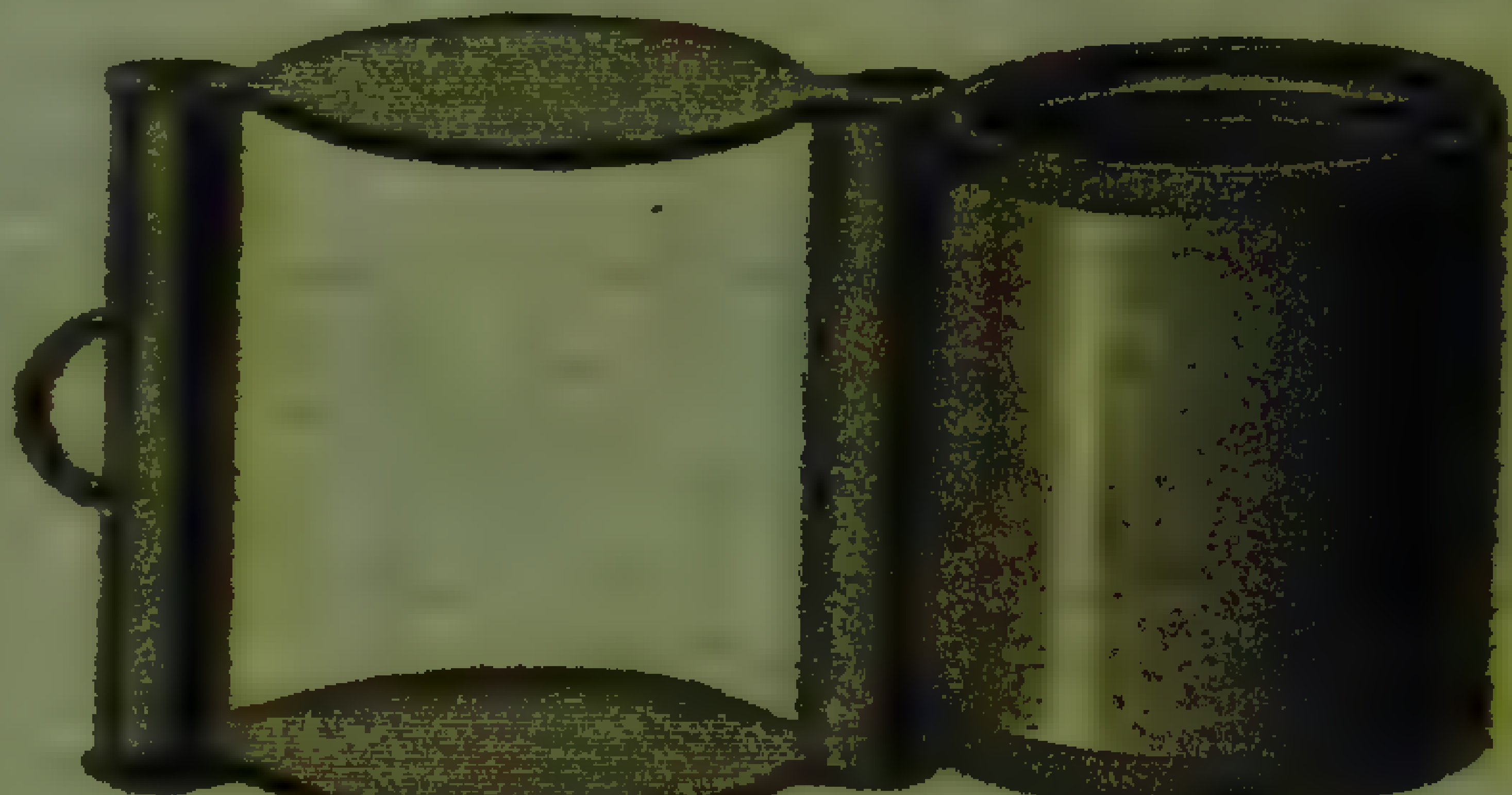

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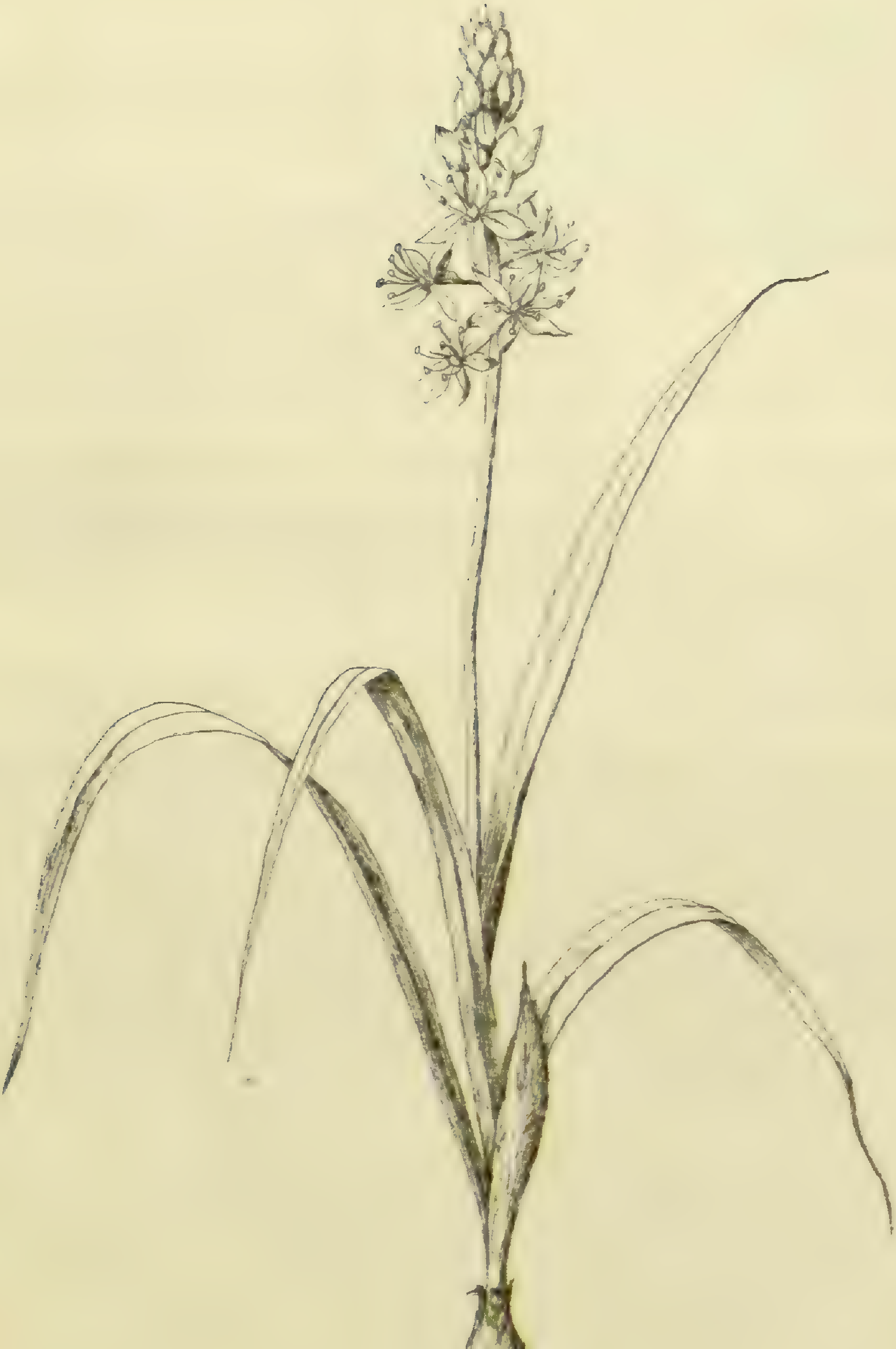


WILD HYACINTH.

(Camassia Fraseri.)

THE AMERICAN BOTANIST.

VOL. IX. BINGHAMTON, N. Y., SEPTEMBER, 1905. No. 3.

THE WILD HYACINTH.

Camassia Fraseri.

STEM bulbous, subterranean; leaves linear, keeled; flowers many, racemed, bracted; perianth of six three-nerved divisions; stamens six; style one, threadlike; capsule triangular-globose, three-valved, loculicidal.

In recent years one seldom takes up the catalogues of dealers in bulbs without finding listed therein the plant which forms the subject of this sketch, but those who cultivate it can form but an imperfect idea of its loveliness if they have never seen it in its native haunts. It seems to need the setting of its marshy habitat to appear at its best, but there the tall spires of blue, pushing up in profusion above the coarse grasses, remind one of the small purple fringed orchid, though the two flowers are not at all alike in either form or color. All the species belonging to the genus *Camassia* are reported to delight in rich meadows that are wet in winter and spring but dry in summer, but our plant is often found in less watery situations and occasionally grows on railway embankments.

Like many other liliaceous plants, the wild hyacinth flowers early in spring, being about cotemporary with the shooting star (*Dodecatheon meadia*) which often grows with it. The perianth is wide spreading and blue in color, the latter circumstance probably accounting for its common name. The flowers at the base of the raceme open first, and though the life of the individual flowers is short, the numerous buds keep the plant in blossom for some time. The flowers secrete nectar at the base of the perianth segments and are visited by bees of various species, but stamens and pistils appear to ripen about the same time and no special adaptations for cross-pollination are discernible.

In the case of many bulbous plants, the individuals rapidly increase in numbers by means of bulblets formed in the axils of the old bulb scales or wrappings, and in such cases few seeds are produced. The wild hyacinth, however, does not readily multiply by bulblets, but it produces seeds in abundance and these soon grow into thrifty plants. They are said to begin blooming when about three years old.

Although *Camassia* is closely allied to *Scilla* from which the well-known drug squills is derived, it once formed a part of the Indian's bill of fare and was known as quamash or camass. Indeed, from the Indian word for the plant, the generic name was derived. While the bulbs of this particular species were undoubtedly eaten by the Indians there are many who consider a western species, named *Camassia esculenta*, to be the true camass. The difference, however, is a trivial one, for *C. esculenta* and *C. Fraseri* are often regarded as two forms of the same species. The flowers of *C. esculenta* are somewhat larger. This form occurs from California and Utah northward, while *C. Fraseri* is found from Pennsylvania west and southward. In suitable situations it is often abundant enough to afford considerable sustenance and no doubt often helped the Indians over periods in which other food was scarce. There are less than half a dozen species in the genus *Camassia* and all are restricted to the temperate parts of North America.

STAR FLOWERS.

BY DR. WILLIAM WHITMAN BAILEY.

IT is in some ways a great pity that the name *Asteraceæ*, "star flowers," as suggested by Lindley, could not have been established. Of course, I mean other things being equal. I am the very last one to approve radical changes of nomenclature. I believe in letting the sleeping dog rest; if awakened he may disturb the whole camp and be the cause of much bad language.

The points in favor of the name *Asteraceæ* are: first, that it is in harmony with common usage where the family title is derived from the name of a representative genus of the family; secondly, that it calls to mind the most frequent, almost invariable feature of the plants, namely their star-like heads.

On the other hand, the old name *Compositæ*, bestowed at a time when the heads were supposed to be individual flowers made up of other smaller ones, is so deeply rooted in usage of literature and address that it would be a crime to change it. Of course, we now know that the apparent flowers are inflorescences, made up of many usually minute florets, and surrounded by a calyx-like involucre.

It is, or used to be, customary in schools and academies for the teacher to dismiss this interesting family with the remark that it was too difficult for his pupils. This commonly meant that he did not understand it himself. While the difficulties are great and should not be minimized, they are not insurmountable. Any clear-headed scholar is capable of overcoming them.

To do this, we have ever found it expedient to write an accurate description before making attempt to trace the plant to its name. Every beginner has a tendency to chase a plant to the title he thinks belongs to it. Thus, I have often had the white-weed (*Chrysanthemum leucanthemum*) brought to me, named and described as the daisy (*Bellis perennis*). The non-observer had caught at a name, and when asked what significance is there in the adjective of Burns "wee crimson tipped" to these large white heads, would begin to open his eyes. If the teacher is inquisitorial and merciless he goes on with "the question." For instance, "your books say *Bellis* is but a few inches in height, with leaves all radical; your plants, on the contrary, shows a leafy stem and is perhaps a foot in height. The shape of the leaves and the size of the heads are quite different." By this time the culprit owns he worked back from the index and pleads for mercy.

Now, by following a system of description all this is avoided, nor does the pupil look all at once upon a confused mass of data. While describing the leaves, he has nothing to do with the stem, and while on the stem, foliage and flowers are not under consideration.

The family *Compositæ* is the largest of the flowering orders and includes one-tenth, at least, of all Phanerogamous plants. Here, in the United States, it is probable that by August and September this proportion is even higher. There are but few in early Spring—the dandelion, the early everlasting (*Antennaria plantaginifolia*), the colt's foot (*Tussilago farfara*) and the golden rag-wort (*Senecio aurens*). After May they rapidly increase until finally wood, meadow, hill and vale teem with them.

While the family is an easily recognized one, it is well to sum up its more manifest characteristics and to point at the differences between it and certain nearly related, but much smaller groups.

In considering the features of a large assemblage of plants which have caused it to be styled a family, we must note in what points they all agree. There will be a type which nature modifies most variously. These modifications lead to the conception of genera and species.

We find Compositæ have these points in common:

A. Mixed inflorescence, in which the *special* clusters (heads) are indeterminate, but the heads themselves cymously disposed.

B. Florets, commonly minute, either tubular or strap-shaped and either kind alone or tubular florets associated with strap-shaped ones.

C. A calyx-like involucre surrounding the florets.

D. Calyx coherent with ovary, with or without pappus.

E. Corolla gamopetalous 5 or 4 lobed and valvate in the bud.

F. Anthers *syngenesious*, i. e., united leaving filaments free.

G. Stigma usually two-cleft, but the ovary (and resultant achene) one-celled, with a single basal, inverted ovule.

The general star-like appearance of the heads, as instanced in a sunflower, accompanied by the above details, serve to distinguish the family.

Certain other groups have similar heads and calyx-like involucre, notably the teasels (*Dipsaceæ*) and the calycids (*Calyceae*), but the first has a four-leaved involucre closely enveloping the ovary, no pappus, four-cleft corolla, four distinct stamens and a suspended seed with albumen. The seed of Compositæ shows no such endosperm.

Many years ago a writer in *The American Naturalist* (Tracy) spoke of *Compositæ* as among The Royal Families of Plants. Humble as individuals may be, even tramping among weeds, they ever bear the regal star of their house. They disdain to work, and it is rather an effort even to show off. Hence we find but few of them in flower-gardens—in proportion to the immense size of the family. Still rarer are those that in any way claim an economic interest. There are a few good plants—lettuce, dandelion, chickory, artichokes, etc.—but none of these are important. Arnica is used for wounds, but it is of doubtful importance. Compare this record with that of the rose, pea or grass families, the lilies or the nightshades. No, Compositæ are travellers, wearing their insignia always and never ashamed. Often they plainly show their regal origin; quite as often they disdain it, taking to highways, hedges and the strand for a living.

Brown University, Providence, R. I.

TO THE TOP OF LONG MOUNTAIN.

BY WALTER ALBION SQUIRES.

LONG Mountain is a distant isolated spur of the Bitter Root Range. It lies along the western boundary of the Bitter Root Forest Reserve and is about twelve miles in length. Near its southern end it reaches its greatest altitude in two prominent wooded crests, which are probably something over five thousand feet in height. From these two peaks the surface of the country drops precipitately with steep and winding canyons and broken rocky ridges, down three thousand feet or more into the valley of the Kooskooskie.

On the morning of the twenty-eighth of May I left the Discovery Mine about three miles west of Long Mountain and on one of the numerous creeks which come down from its slopes. My plan was to spend the day studying the flora of the slopes and if possible to make my way to the summit. The western slopes of the mountains are usually well wooded with dense forests of white and red fir, spruce, yellow pine and some white pine. Here and there one finds a few trees of the western larch. These are splendid trees peculiar to the Pacific Northwest and they are without doubt the world's largest larches.

In the bottoms of the gulches the ground is low and swampy and here the giant arbor-vitæs or cedars as they are called here attain their greatest size. Destructive forest fires have swept up many of these gulches leaving behind them a barren waste of blackened half-burned stumps and fallen trees. I had gone only a few rods when I came upon a tall shrub just bursting into bloom. I had frequently seen it before but never before in blossom. I found it to be a member of the buckthorn family, perhaps *Ceanothus sanguineus*. The low grounds along the creeks are favorite haunts of ferns and sedges. Dwarf cornel (*Cornus Canadensis*) clung to the overhanging banks of the streams or clustered about the base of huge cedar stumps. Its snow white bracts gave a beautiful and pleasing effect among the dark green leaves. In the boggy, moss-covered soil certain tall rein orchids (*Habenaria hyperborea* and *H. dilatata*) were just coming into flower. Twisted stalk (*Streptopus amplexifolius*), three species of false Solomon's seal and another liliaceous plant somewhat resembling them (*Prosartes trachycarpa*) are among the common plants of the forests. Other dwellers of the lowlands are the tall lungwort (*Mertensia Siberica*), false hellebore (*Veratrum Californica*), mitre wort (*Mitella trifida* and *M. pentandra*) and baneberry (*Actæa spicata arguta*).

On the wooded slopes I found several species of pyrola. One of these (*P. picta*) has fine dark green leaves mottled and blotched with white. Other members of the heath family noted in the dense woods were pipsissewa, Indian pipe and pine drops. Neither of the last two named had begun to grow to any extent, but the pale upward-growing shoots of the Indian pipe could be found at no great depth down in the mold among the blackened stems of last year. The tall brown stems of the pine drops are striking objects all through the fall and winter. They then shed an abundance of fine chaffy seeds. Under a small lens these seeds are transformed into objects of unexpected beauty. They are surrounded with a thin netted membrane more delicate than any insect's wing, and it glistens with a glow of iridescent colors.

Pipsissewa is indeed a lover of the winter, for its shining evergreen leaves seem never so fresh and green as when they peep out from the snow and ice of their wintry covering. In places the trailing evergreen stems of the twin flower (*Linnæa borealis*) covered the forest floor or spread a thick green mantle of beauty over decaying stumps and logs. This little favorite of the immortal Linnæus was not yet in flower.

Another beautiful child of the great north woods which I found quite abundant on the slopes of Long Mountain was that delicate little orchid *Calypso borealis*. There are those who have seemed to see in the beautiful things of nature only a product of the "struggle for existence" and "survival of the fittest." As I gaze on some beautiful flower like this little orchid of the forest, there comes the thought that the struggle for life might have produced a beautiful flower but not one like this. There is something more than that behind the beauty of the lily and the perfume of the rose. Can the struggle for life account for the beauty of the *Adiantum* fern, or the pearly luster of the shell which grew on the dark ocean floor a thousand fathoms from the light of day, or for the golden, bronze, and scarlet glory of our autumn woods, any more than it can account for the beauty of the crystals in the snowflake and the rock, the fire in the ruby's heart, or the splendors of the sunset?

There is in all these a transcendant beauty far above all thought of mere individual advantage; a beauty all unexplained unless we concede it begotten, loved and cherished in the great heart of God.

Climbing through thickets of service berry, mountain maple, willows, and wild cherry, I was now approaching the summit of the ridge. The vegetation here assumed a much more vernal appearance. Yellow dog's-tooth violets, spring beauties, wood anemones and trilliums; flowers which had long ago passed out of blossom in the valleys were here in full bloom. A beautiful wild clematis (*Clematis verticillaris*) with blossoms three inches across was very abundant on the summit of the ridge. From this point I began to make my way along the backbone of the mountain towards the two high peaks which lay about three miles to the southward. As I approached these I was surprised to see a glistening expanse of white appearing through the trees. Turning aside into a deep gulch on the north slope of the mountain I found a great bank of snow. Mountain ash and alder here were beginning to put out their leaves, and dog's-tooth violets and false hellebore were just piercing through the leaf mold not a foot from the edge of the snow.

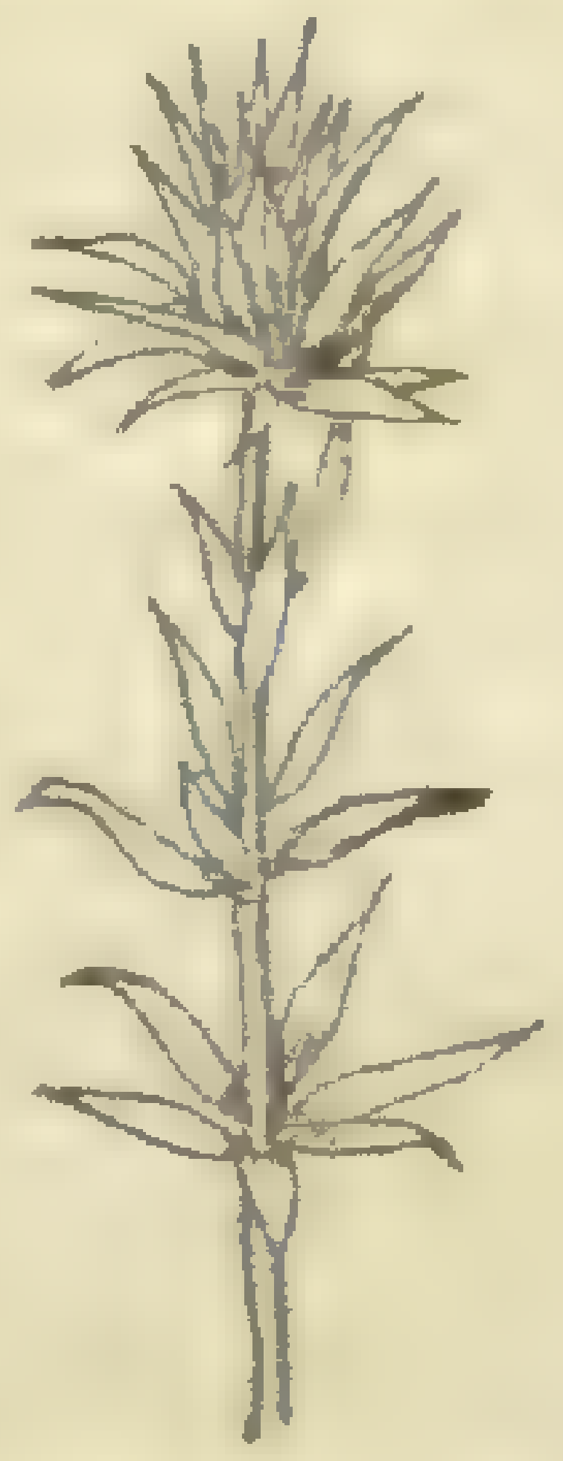
A short climb now brought me to the summit where, among other plants new to me, I found that pleasing little evergreen shrub of the staff tree family *Pachystima myrsinites*. The only other species of this genus is the *P. Canbyi* found at a single station in the mountains of southwestern Virginia.

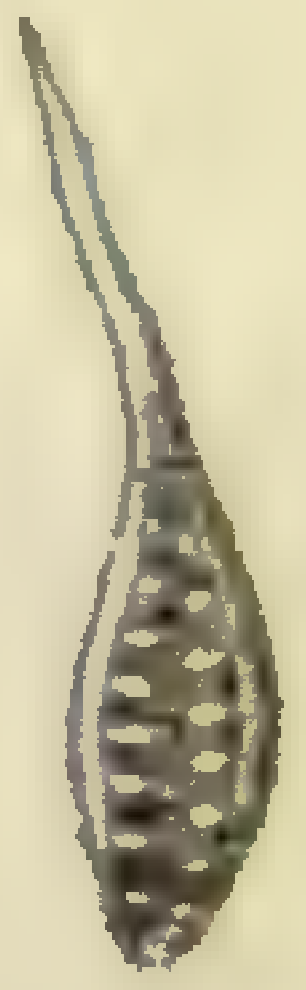
On my way home I found a columbine which I had never seen before. It was three feet in height with bright yellow petals, deep scarlet sepals, and hooked spurs. I suppose it was the species described by Watson as *Aquiligea flavescens*.

Kooskia, Idaho.

A CURIOUS COLUMBINE FLOWER.

BY WILLARD N. CLUTE.





AMONG the more interesting freaks of plant life are those that are of such a nature as to throw light upon the way in which plant structures have been evolved. An interesting instance of this kind was discovered by the writer last June while botanizing in the vicinity of Joliet, Illinois, and is illustrated herewith. It was produced by the common columbine (*Aquilegia Canadensis*) and is manifestly a flower, though at a short distance it had scarcely any resemblance to ordinary blossoms. The plant that produced this curiosity was like ordinary plants save for its anomalous blossoms of which it produced a profusion. These latter are among the most complete cases of "reversion" that have come under the writer's notice. There is no trace of the tubular spurs of the ordinary columbine flower, but all parts, petals, sepals, stamens and pistils are replaced by flat greenish leaf-like organs. Each whorl of the flower is separated from the others by an appreciable internode and viewing the flower it is easy to believe the botanist's statement that a flower is a modified branch. As one might expect the lowest whorl, or that which answers to the calyx, is most distinctly developed, but the petals are also noticeable and only the stamens and carpels exhibit a tendency to run together. The stamens give no token of their nature by their form, but the carpels, though leaf-like, have their edges partly rolled toward the center of the upper surface and on each edge is a row of embryo seeds. From this it appears that the carpel is morphologically the equivalent of a single leaf with its edges incurved to form a cylinder, and the ovules as bud-like bodies from the margin.

The plant that bore these blossoms was transferred to the Forest of Arden, near Joliet, by the forester Mr. H. C.

Skeels where we hope it may continue to produce its curious blossoms in other years. A number of the largest flowers were also preserved in formalin.

SALAL.

BY W. W. MUNSON.

LAST summer along the upper reaches of the Sacramento River and in the foot-hills of Mt. Shasta I daily saw a low shrubby plant with large, thick, shining, leathery leaves and tough, wiry stems, always in company with the Oregon grape. It often bore racemes of ripening fruit which had a familiar look, but I could not make it out. Though I asked people nobody had a name for it, however common.

All across Oregon wherever I stopped—at Grant's Pass, Ashland, Glendale, Salem, Portland—this little shrub, getting taller as I went north, was the most common of the under-brush until one day, in a partial clearing out from old Fort Vancouver, Washington, I found a spray of flowers on my little stranger. The globes seemed to have a home-like look, recalling our eastern wintergreen. Then *Gaultheria* quickly followed mentally, and it came to me with a rush that this was the very thing that Lewis and Clark found about their feet all along their way after they crossed the mountains, and the one that the Indians told them was *Shallon*. (I didn't have any Indians to tell me.)

I threw up my hat, laughed till I cried, and shouted "Glory" all alone there in the deep woods of the northwest territory, where the books say it is found, At last, after many years of longing, I have found "Shallon" in flower and in fruit! (I read Lewis and Clark's diary of their trip, every word of it, more than fifty years ago.)

As I remember, Fremont, and perhaps others, understood the Indians to say "Sallon," and "Salal" and "Shalal" when they were asked what they called it. But whatever, botanists have settled on *Gaultheria Shallon* for its name.

In northern California salal is but a few inches high. It gets taller as we go north, and at Vancouver, B. C., I saw where trails had been cut through solid masses of it, and the wall on each side was higher than a man's head. I separated out single stems that were more than eight feet long.

Pasadena, Cal.

CURIOUS DEVICES FOR PLANT PROTECTION.

INTERESTING examples of self-protection are offered by several plants growing in Guam, the most striking of which is the spiny yam (*Dioscorea spinosa*). This plant grows spontaneously on the island and in places forms impenetrable thickets. It takes its name not from the small prickles on the stem but from a mass of spines surrounding the base of the stem and serving as a protection to the starchy tubers below from hogs and other enemies. They are wiry and branching and have very much the appearance of sharp compound fish-hooks. In reality they are lateral roots which differ from typical monocotyledonous roots in their hard woody structure and the absence of root-caps. Whether or not these spines have been specially developed for the purpose of protecting the edible tuber may be questioned, but that they do protect it is certain.

Among the principal food staples of Guam is the taro (*Caladium colocasia*) a plant of the *Arum* family. Both the land and water varieties are found to have their smooth, succulent, satiny leaves free from the ravages of snails, insects or herbivorous animals. Cattle and chickens delight in nipping off the young leaves of bananas and plantains, deer often inflict serious injury on a young coconut plantation in a single night, breadfruit trees suffer from the attacks of all herbivorous animals and must be protected from them, fruit, leaves and bark, and even tobacco will be devoured in the field by insect larvæ unless it is carefully watched and tended. On chewing a portion of a taro leaf the cause of its safety from attack is apparent. The tongue, roof of the mouth and lining of the throat seem pierced by a thousand tiny needles. A careful chemical and histological examination of fresh taro plants was made for me by Mr. Lyman F. Kebler and Mr. B. J. Howard. The result of their examination and experiments tend to corroborate the theory that the burning sensation experienced on chewing the leaves is not caused by an acrid fluid but by minute needle-like crystals of calcium oxalate contained in the tissue. Many plants in which these crystals are found are not acrid to the taste but most of the Araceæ, including our own Indian turnip or Jack-in-the-pulpit, are intensely so. In some plants the crystals are developed singly in a cell of the parenchyma; in other cases they are in the form of radiating clusters, while in others, including several families of the monocotyledons, they form compact bundles called raphides. These raphides are sometimes found in a cell which can easily be separated from the remaining tissue of the plant. In *Caladium* and *Alocasia* they are inclosed in what appears to be elongated transparent capsules filled with mucilage. These capsules or cartridges are situated in the partition walls between two vacuoles, their ends projecting into the adjacent vacuoles. When the vacuoles become filled with water by being crushed in chewing, or when artificially macerated, the mucilage absorbs water through the capsule walls increasing the volume so that it exerts such a pressure that the needles are ejected with considerable force from the capsule at one or both ends where the cell wall is thinner than at the sides.—*From Useful Plants of the Island of Guam by W. E. Safford.*

FRUITING OF A PALM.—It is the habit of several species of palm to fruit but once in a lifetime, the trees dying soon after the fruit is ripened. According to *Gardening World* two photographs of palms of this kind—*Corypha elata*—were recently sent to the Linnæan Society. One of the specimens shown had produced more than fifty thousand fruits, weighing half a ton in the aggregate!

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items.

SHELF-FUNGI WANTED.—Mr. C. G. Lloyd, Court St., Cincinnati, Ohio, having erected a large three-story brick building in which to house his fine collections of fungi, now asks for specimens of woody fungi of all kinds. A large number of botanists from all over the world have assisted in building up this collection and all who are inclined to help will find it easy to do so. Mr. Lloyd offers to name specimens when desired and no one interested in the fungi of his region should neglect this opportunity to obtain their correct names. Select several good specimens of each species and thoroughly dry them before sending. Number each kind and keep one of each so that you may know to what species the names refer when returned. Last but not least, Mr. Lloyd's illustrated mycological publications are sent free to all who contribute fungi. All who can should begin the collection of these plants at once. All the woody outgrowths from old logs, stumps, trees—living or dead—etc., are desired.

CONSPICUOUS COLORED STAMENS.—There are very few flowers in which the color of the stamens may be said to add a noticeable feature. The bittersweet (*Solanum dulcamara*), however, is of this type the yellow cone of stamens on the purple ground making the flower far more attractive than it would be without this help. The common potato also has a blossom with similar contrasts. This may be compared with the potato's near relative the tomato, in which corolla and stamens are of the same color, and it will be seen at once how much the latter loses without such a color contrast. The stamens of moth mullein (*Verbascum blattaria*) also may be instanced and there are doubtless others to be found in any locality.

ANOTHER MAYFLOWER.—I have heard the name "Mayflower" given to the *Anthemis cotula*, called by others "Path weed."—*Elwyn Waller, Morristown, N. J.*

COLOR OF THE MEADOW LILY.—Referring to the notes on the color of the flowers of the meadow lily (*Lilium Canadense*), Mr. C. F. Saunders, of Philadelphia, says: "*Lilium Canadense* down our way is always *yellow* in my experience. In western Pennsylvania in the Alleghany forests I have found it both red and somewhat more contracted, as to perianth, looking almost like *L. Grayi.*" The question why this lily is red in one region and yellow in another still needs an answer. We would be glad if every reader in whose locality this plant grows would let us know by postal what the color of the flowers are in their localities. Any observations or notes as to whether the differences in color may be due to soil, elevation, latitude, moisture, or sunlight will also be acceptable.

THE USE OF ELDERBERRIES.—In a discussion of the subject recently in pie-eating New England, the editor was surprised to find that many people are still ignorant of the fact that the berries of the common elder (*Sambucus canadensis*) make excellent pies. Others who have tasted so-called elderberry pie were inclined to call it a nauseating mixture. The trouble is not so much in the pie itself as in the way it is put together. Pies made of fresh elderberries are scarcely likely to appeal to many palates. The fruit still retains some of the rank eldery flavor possessed by the entire plant and made evident when the stem is broken; but if one will collect the berries when fully ripe and dry them in flat trays in the sun or in a warm oven he will have a cheap and appetizing material from which to manufacture pies all winter—and pies that are not inferior to huckleberry pies in flavor. The eldery flavor seems to be dissipated by drying. The berries stewed and sweetened are also in demand in some households as sauce. The berries are also of some medicinal value and thus have an additional claim to our attention as a winter food.

INSECT CONTROL OF PLANT DISTRIBUTION.—In discussing the distribution of plants we rarely take into consideration the fact that among entomophilous flowers, at least, insects are as important factors in determining their range as is soil or perhaps temperature. It is clear that if all other conditions are right the absence of the insects which pollinate the flowers of a certain species would, if the flowers were not self-fertile, present such species from occurring there.

EXTERMINATION OF GALAX.—Extermination of rhododendrons suggests that the *Galax aphylla* of the Carolinas is apparently in a fair way to be exterminated. I was at Asheville, N. C., in 1885-7, and at that time many of the wooded hillsides were covered thickly with the plant. The leaves were used there for decoration but that draft on them had no perceptible effect. I brought some of the plants north with me, and some lived here for some time, but did not make seed. The longest-lived one lasted for about three years. I took some of the plants to an old Scotch florist in New York. It was new to him. After studying it up he reported to me that in colonial times galax plants had been exported to Great Britain, and had there been cultivated as ornamental plants, but it was unknown to our northern florists. Since then quite a trade in galax leaves has sprung up and they are offered by the thousand ($1 to $1.25 per 1000) in the florists' trade papers. They are used almost exclusively in funeral decorations, so much so that many florists consider that the introduction of galax leaves into a floral piece, stamps it at once as a funeral design. About two years ago I asked a friend living in Asheville to get for me a few of the plants. He reported the utmost difficulty in finding any at all. They seem to have been practically exterminated in that section. I have not inquired about the orange-flowered azaleas which used to brighten the woods in that part of the country, but from the numbers that I have seen on sale in the New York market I fear for their preservation also.—*Elwyn Waller, Morristown, N. J.*

SOAPWORTS.—Regarding the soapiness of New Jersey tea Mr. C. F. Saunders writes, "I tried a handful of blossoms the other day in a basin of water and got a fairly good lather in a minute, though the lather was not as smooth and soapy as some of the California species yielded me. This beats bouncing Bet (*Saponaria officinalis*) for I could never raise anything but a miserable green froth out of the latter."

TUMBLEWEEDS.—Apropos of the article in the July BOTANIST, by Mr. Squires, the tumbleweeds in the neighborhood of Denver do not seem to be *Amarantus* at all, but are either *Cyclocloma platyphyllum* or Russian thistle —mostly the thistle of late years. Ten or twelve years ago the prairie tumbleweeds seemed to be almost entirely *Cyclocloma*. The Russian thistle had then much less foothold. The winter of 1904-1905 being cold and snowy in Denver as in the rest of the country, no weed got much chance to tumble. But the winter of 1903-1904 was extraordinarily warm and dry, and the high winds, that state of things always brings, rolled about hundreds of weeds. So far as I observed, they were all Russian thistle. I examined about forty carefully and others casually and all were thistles. This is not surprising, perhaps, as the Denver authorities seem to be doing their best to encourage the growth of Russian thistle by cutting down the tall flowering plants—sunflower, prickly poppy, evening star, etc.—before they can seed, but they never touch the thistles. Perhaps this is on the principle of the man who couldn't mend his roof when it rained, and did not need to when it didn't rain. After the thistle gets spiny it can't be cut and when young it forms such beautiful soft mossy mats on the vacant lots that one never thinks of it as a noxious weed. I should like to know whether the cause of my finding the Denver tumbleweeds all thistles was due to the plants of *Cyclocloma* being fewer in numbers than in years past, as Mr. Squires' article would suggest, or to the fact that Russian thistle grows in such overwhelming quantities on all the vacant lots in Denver, while *Cyclo-*

cloma grows more out on the prairie, and is not common on the vacant lots. My observations were made in a newer part of the city, where there are many vacant lots but the open prairie is near. Also, I wonder whether the time at which Russian thistle becomes spiny depends on the season of the year or the age of the individual plant. In weeding my garden, it has seemed to me that little plants, whose seeds had evidently had no chance to grow till late in the season, begin to be spiny and hard to handle at the same time (early in August) as the big plants which started in April. But my observations have been neither many nor accurate enough to generalize from. —*A. S. L., Denver, Colorado.*

WILTING OF FLOWERS.—The time when they are gathered makes a great difference, perhaps more than the individuality of the gatherer. If the air is cool, and the plants not in a state of rapid supply of the evaporation from the leaves, they keep much longer. Also if one plucks with them the larger leaves near the base of the stalk, and *leaves them attached* evaporation will often wilt the whole spray. Keeping them as much shaded as possible on the road home also makes a difference. Enclosed in a tin botanical box many sprays will stand a short trip perfectly, though they would wilt if exposed to the air during the same length of time. In other words, evaporation from the leaves is one of the most important factors. There are no doubt many others as the species of plant, the age of the plant, the period of inflorescence, and the like.—*Elwyn Waller, Morristown, N. J.* [The note which prompted this interesting reply referred to an occurrance not touched upon by Mr. Waller. It often happens that of two persons going flower gathering at the same time in the same locality to get the same kind of flowers, one will return with a fresh bouquet while the flowers gathered by the other will be so wilted as to be absolutely worthless. It seems a personal peculiarity. The editor has seen instances of it many times and is acquainted with one of the unfortunate individuals in whose hands a fresh flower will wilt in a few minutes.—ED.]

Editorial.

All who love nature can but deplore the vast ignorance of the decorative features of our native flora, that characterizes those in charge of our avenues of travel, the wagon roads and railways. Man has no sooner laid out a road through a country district than nature begins to decorate it with a multitude of vines and flowers. The ugly scars left by plow and scraper are covered with lilies, boneset, Joe-pye-weed, clematis, gentian, milkweed and many another that add a hundred fold to the beauty of the wayside in the estimation of all but the roadmaster. That individual, having made the road a waste from fence-row to fence-row in the beginning, insists upon keeping it so, and calling his assistants soon "improves" the road by again laying low all the plants that border it. In many states such ignorance cannot be charged entirely to the road makers for laws have been enacted requiring that such "improvements" be made annually. When such a "clearing up" takes place, the fairest flower and vilest weed share the same fate. Beauty is not its own excuse for being with the average "practical" man. An illustration of this came under the editor's notice last summer in which a great patch of the old-fashioned tiger lilies had strayed from a flower garden near the wayside but were promptly cut down in all their glory because they were growing along the road. It made no difference to the man with the scythe that left to themselves the lilies would beautify that particular spot for weeks. His idea of beauty was a dead leavel of green and down the flower stems came.

⁂

The railways act even more foolishly in these matters, if possible, than those in charge of the roads, for many of them have some faint idea that flowers may be made to beautify the right of way. But they rarely go beyond a few geraniums, cannas and foliage plants at the stations.

One who has ever traveled by rail in summer, however, does not need to be told that the wayside flowers between stations command as much admiration from the passengers, whether botanists or not, as any of the cultivated flowers so carefully tended at the points where trains stop. We have never seen a railway station that could compare in beauty with the banks of rhododendrons along the roads through the southern Catskills at certain seasons, or with the great stretches of phlox, and lupine, and butterfly-weed, and puccoon, and coreopsis that border the railways in the territory about the Great Lakes. Other things being equal, who would not travel by the road that runs through the most flowery country? Yet here, again, the section-hand mows without discrimination and the owners of the road view the slaughter without a protest.

⁂

Of course the excuse for cleaning up the roadsides is that it prevents weeds from going to seed and lessens the danger of forest fires. It could hardly be expected, nor could it be desired, that all the vegetation be left untouched, but it would seem as if the mowers might be directed to leave the showy flowers, at least. We can scarcely call ourselves a consistent nation so long as we spend as much as we do on flowers for gardens and grounds, while we remove all the native beauty from the roadsides.

⁂

It is often a matter of remark among botanists that in the southern part of the United States where flowers are most abundant, botanists are fewest in numbers. No botanical magazines are issued in the South and there are comparatively few books relating to the region. *The Florida Agriculturist* hopes in time to change this somewhat by devoting a page weekly to botanical matters, and has begun reprinting the "Botany for Beginners" series now running in this magazine with additional notes likely to be of use to Southern readers. When a Northern botanist visits the South he always finds much in the vegetation to interest him, and it would seem as if all that is needed to awaken the Southern people to an appreciation of the wild flora is some such missionary as the *Agriculturist*.

BOOKS AND WRITERS.

Country Life in America now has a dangerous rival in the *Country Calendar* which is so nearly like it in size, text, type, paper, and illustrations that one has to look at the title to be sure which magazine he has in hand. The publishers of both magazines have plenty of money and we anticipate a very pretty race from rivals so evenly matched. The competition raised ought to be good for readers, writers and advertisers, alike. After some years of experience *Country Life* is a handsome magazine, and the *Country Calendar* though new is not a bit behind it in contents and appearance. The latter is published by the *Review of Reviews* Company.

"Methods in Moss Study" by C. J. Maynard is a unique contribution to bryological literature. The author is apparently less interested in his pupils learning the names of a large number of mosses than he is in their acquiring the power to reason correctly about the structures that come under their notice. The matter in the book is arranged in twelve lessons which discuss the structure, manner of growth and methods of spore production and dissemination in some thirty mosses. Each lesson is accompanied by a plate in duplicate which is intended to be colored by the student, though copies with the plates already colored may be obtained. The book is likely to be of great service to young students leading them to consider the evolution of their plants. (West Newton, Mass., C. J. Maynard, 1905, Pp. 128, $1.25.)

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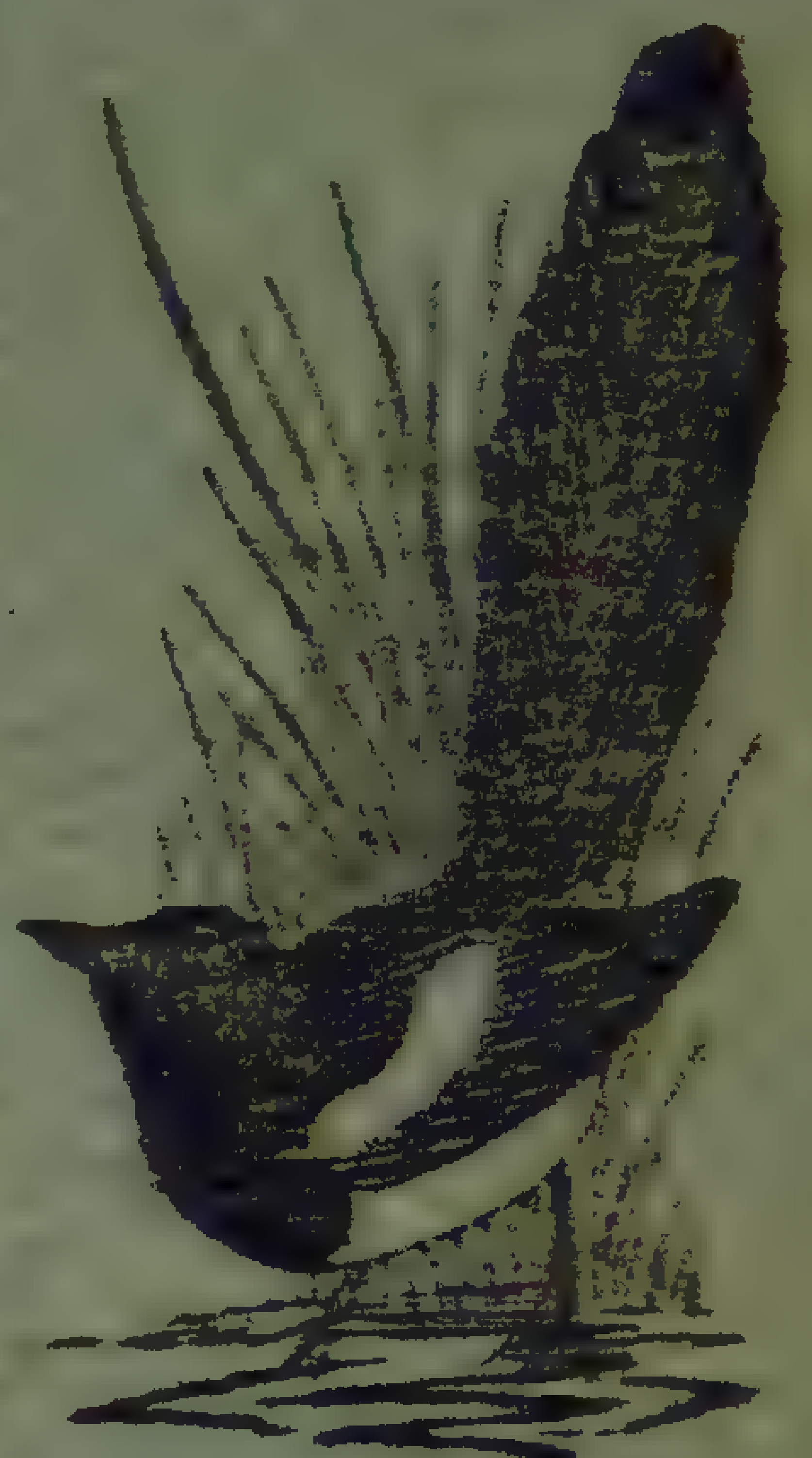

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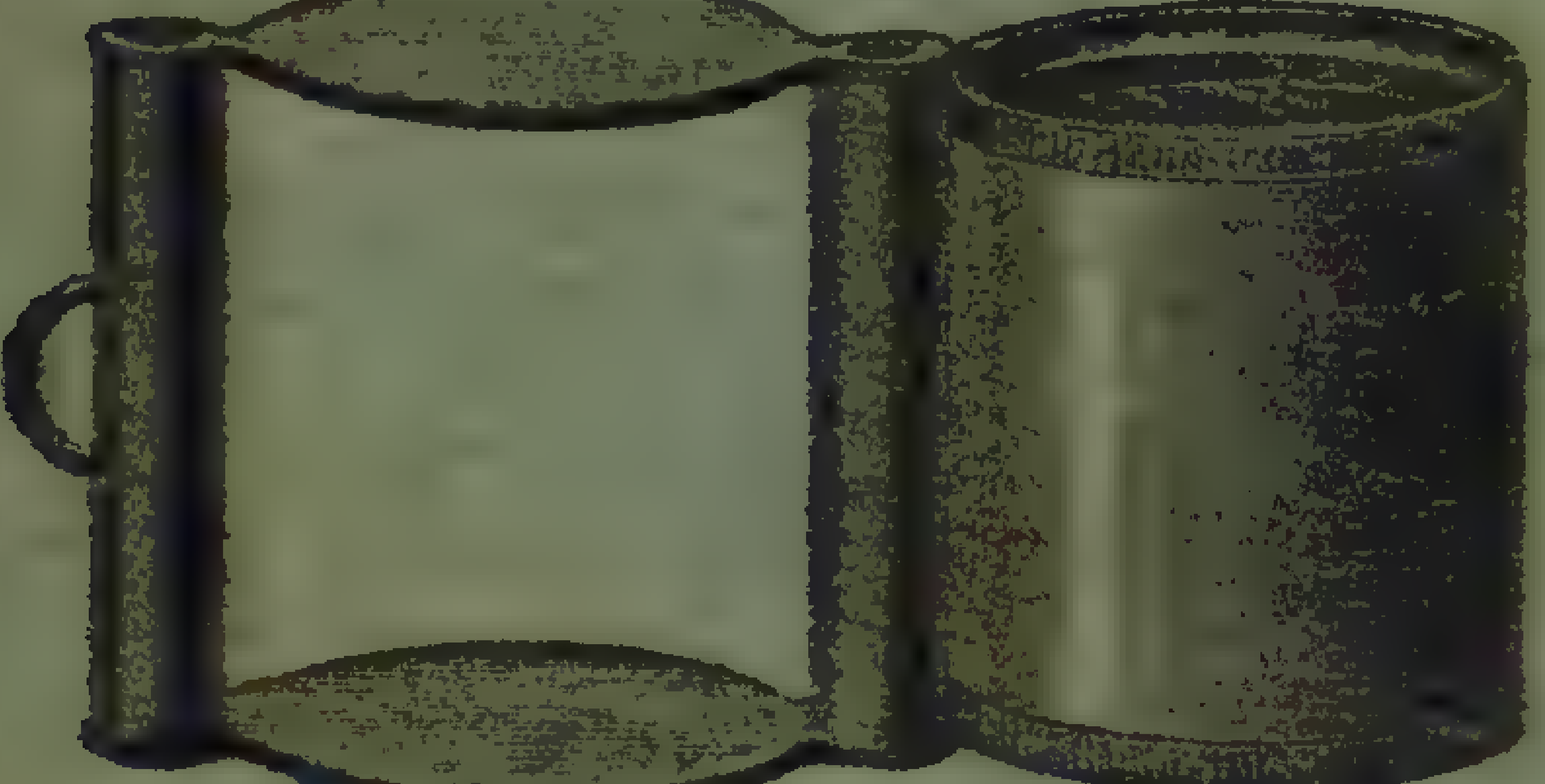

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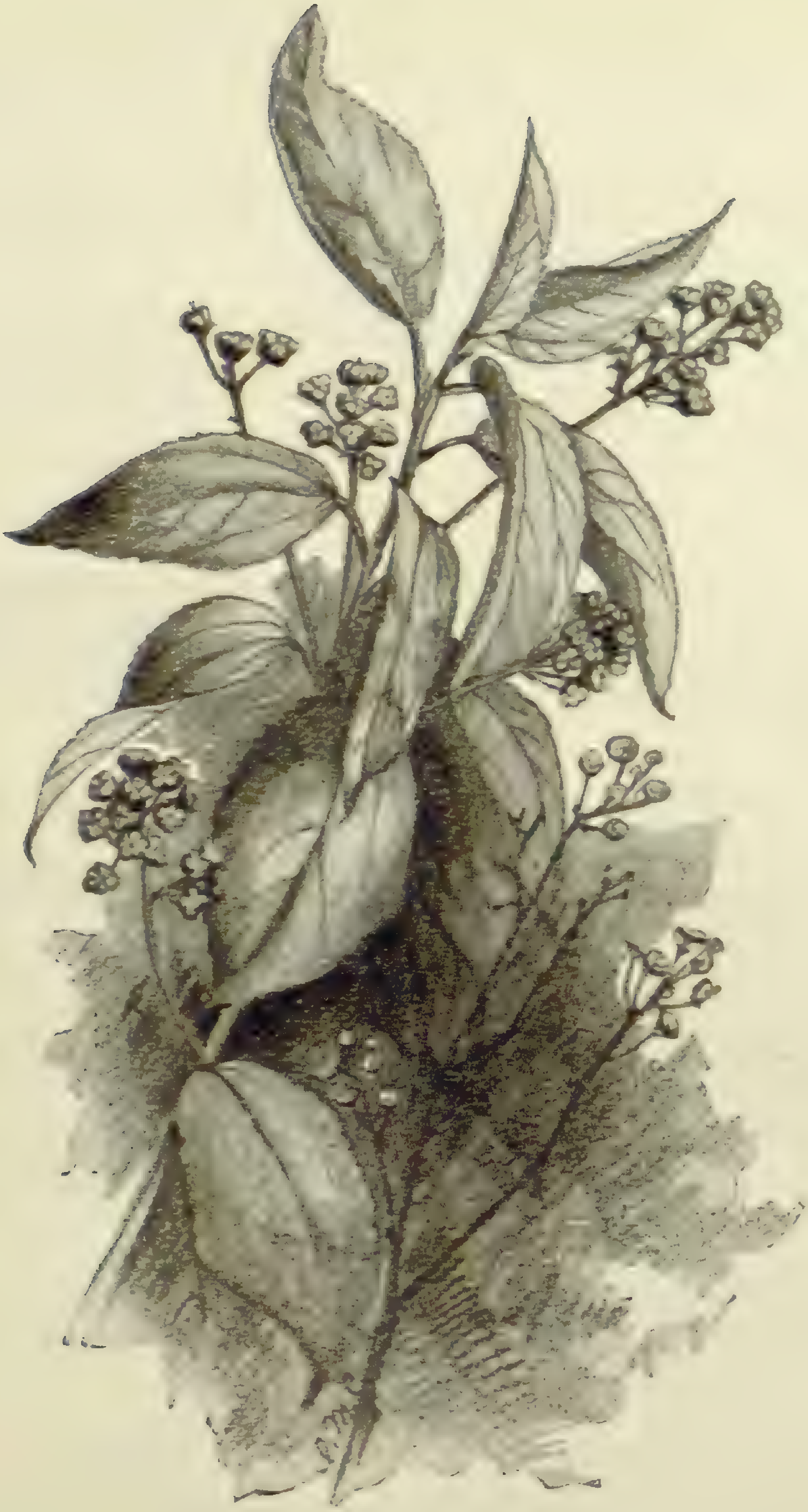


THE NEW JERSEY TEA.

(Ceanothus Americanus.)

THE AMERICAN BOTANIST.

Vol. IX. BINGHAMTON, N. Y., OCTOBER, 1905. No. 4.

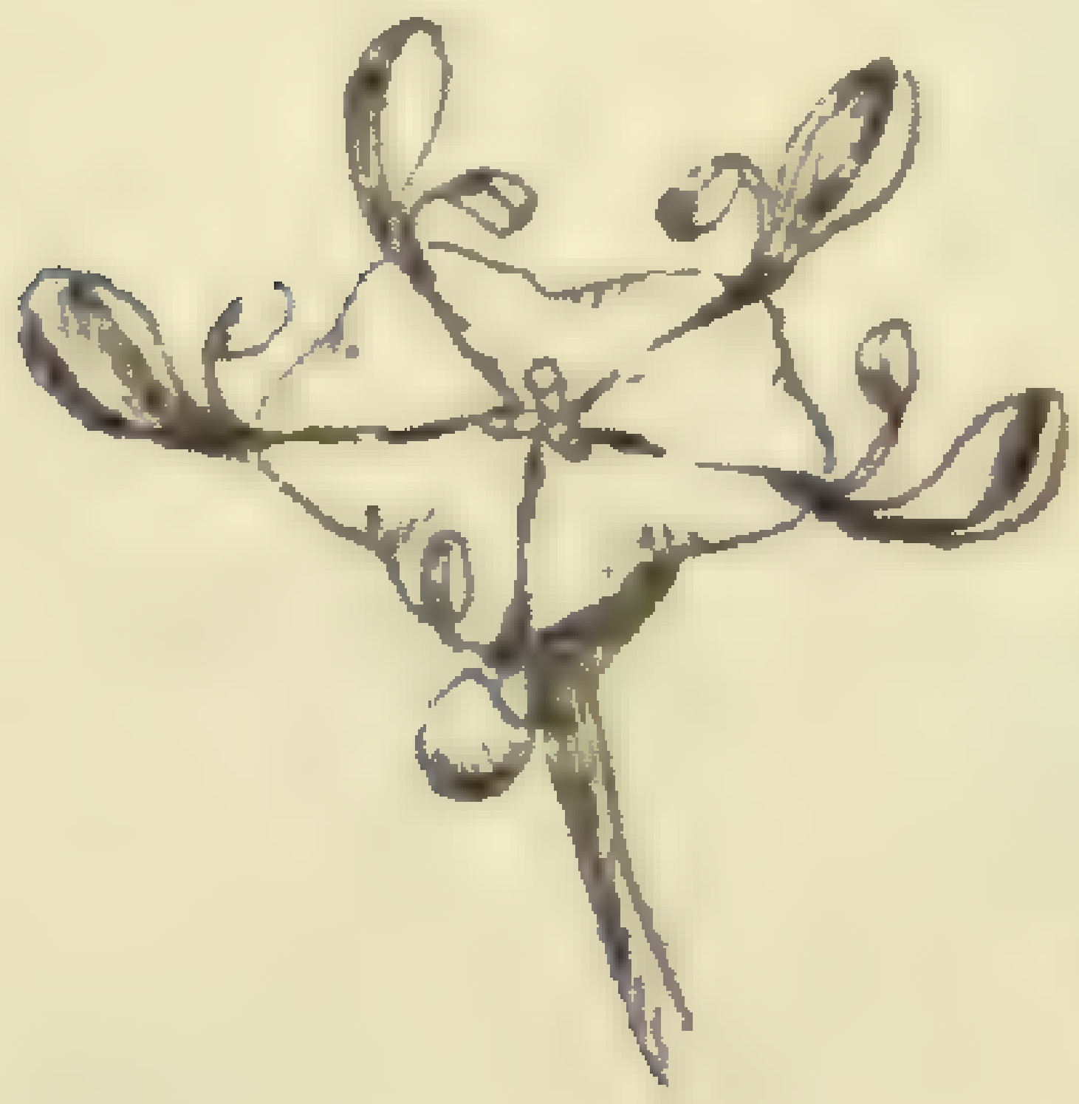
THE NEW JERSEY TEA.

Ceanothus Americanus.

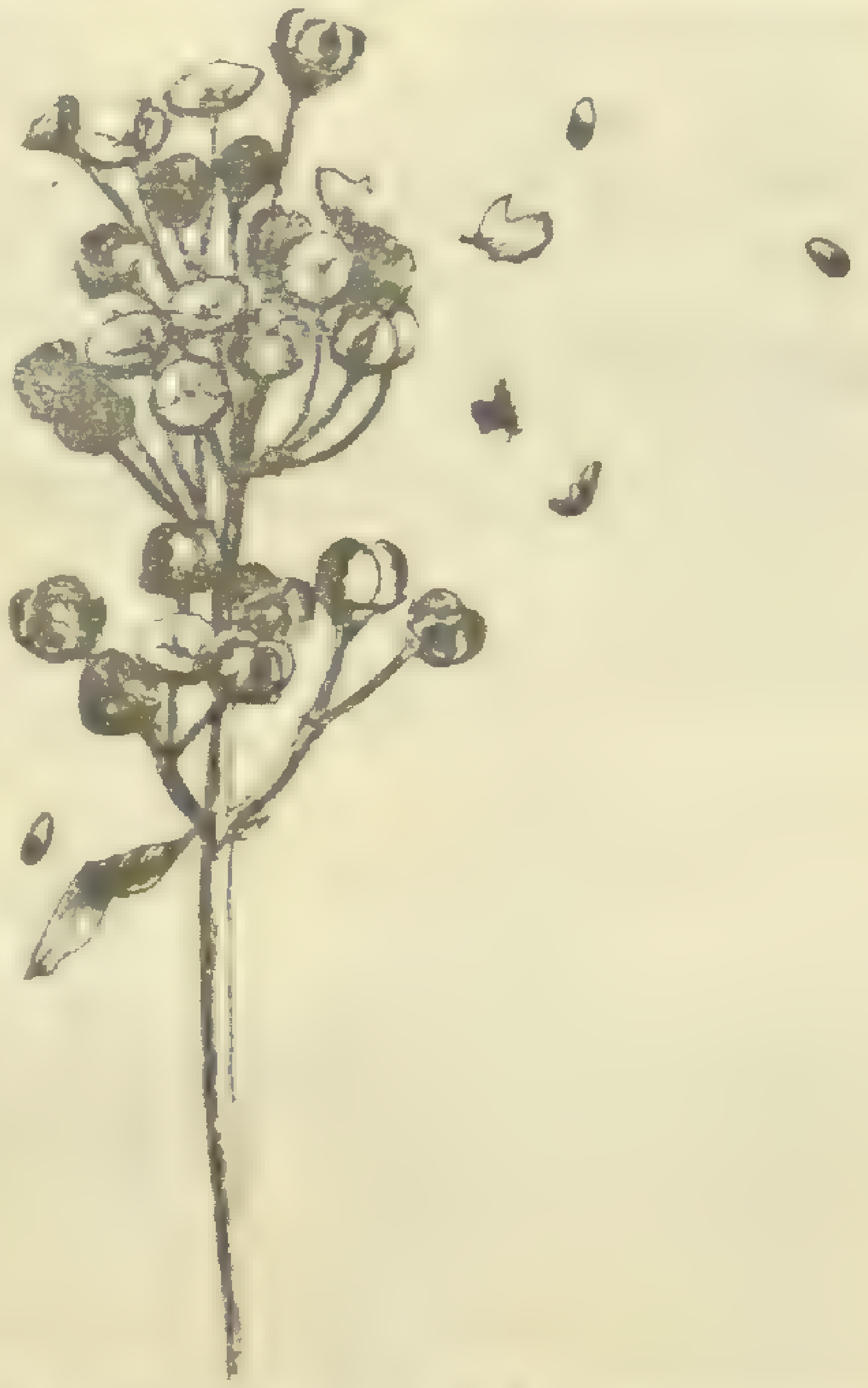
Stems shrubby, two to four feet high, bark reddish brown; leaves oblong-ovate, serrate, three-veined; calyx campanulate its divisions incurved; petals white, hooded; stamens five, exserted; pistil three-celled, three seeded.

THROUGHOUT the vast stretch of territory from Manitoba and Ontario to Texas and the Gulf of Mexico, one of the commonest of the undershrubs is the New Jersey tea. Unlike many of the showy wildflowers it requires no nice adjustments of shade, sun and moisture for its growth, but on the contrary, with a complacency that strongly savors of stoicism, it selects the dry woods and sunny hillsides as an abiding place and flourishes in the sun-baked, sterile soil in a way that few other plants can equal. It seems indissolubly connected with scrubby hillsides, but in level regions it may also occur, especially if the soil be sterile. It seems to fairly court adversity in its selection of dwelling places. Doubtless the secret of its ability to thrive under untoward circumstances is to be found in the roots that penetrate the unfruitful soil, for they are covered with an abundance of nodules, the home of myriads of helpful fungi.

At any time of the year the New Jersey tea is an interesting plant but there are two seasons, one about midsummer, the other in late October, when it lays special claim to our attention. In early July it puts forth a profusion of its tiny cream-colored flowers, cluster upon cluster from the summit of each leafy shoot, and for a time the least observant of ramblers must notice it. It is doubtful, however, if of all the multitudes of plant lovers that have seen the flowers a hundredth part have any conception of the beauty displayed by this lowly shrub. So small are the flowers that it is only the young botanizer with a lens, bent on examining the minute structure of the plant in order to ferret out its name, that really has a chance to see it. As befits so small a blossom, desirous of being seen by insects, all parts of the flower, even the pedicel that supports it, is pale cream-color. The calyx is bell-shaped and erect, with the tips of the divisions curved inward, making a five-angled flower bud. At the time of blooming these tips do not fold back, as in other flowers, but by pulling slightly apart manage to leave room enough between for the petals to slip through which they immediately do, being helped thereto by the impatient stamens, one of which stands before each of the petals and is enfolded by it. After the petals are free of the calyx they extend on long claws at right angles to the axis of the flower. Their blades are hooded and some writers who have not looked closely assert that they enclose the stamens when in flower, but this is an error as anyone can see for himself. Like many of its near allies in the maple and staff-tree families, the ovary is surrounded at base by a fleshy disk. When the flower ceases blooming the upper half of the calyx, only, falls away, the rest, with the disk, forming a shallow little saucer in which the three angled ovary swells to maturity.



The seeds are ripe in late autumn and are distributed by propulsion after a fashion that for oddity and originality quite puts the witch-hazel out of the race. In the late afternoon of a quiet autumn day, after most of the leaves have fallen, one may hear the constant patter of the falling seeds about him and detect the faint snap of the discharge, but I will venture that unless he is let into the secret he will spend more than one afternoon before he discovers the way in which the seeds are scattered. All the books say that the fruit splits into three carpels when ripe but this is only half the story, and the tamest half at that. The truth is that the carpels themselves fly into pieces and in doing so scatter the seed far and wide. So suddenly and so unexpectedly does the discharge take place that the eye is unable to follow it. It is much like the explosion of a fire-cracker. One instant you see the object entire; the next, only flying bits. The only other plant with a contrivance exactly like this is the sand box tree (*Hura crepitans*) of the tropics, whose hard, woody, scalloped fruits, wrapped with wire to prevent their exploding, may occasionally be seen in museums. In both plants it is the evaporation of moisture that sets the spring and this explains why the seeds of the New Jersey tea are distributed toward the end of fine afternoons. The slowly disappearing moisture puts the capsule under unequal strain until the breaking point is reached when with an audible snap it disappears in the air throwing the seed more than a thousand times its length.



One of the most interesting things about the dispersal of the seeds is the uncertainity as to which capsule will be next to go. There seems to be no regular order of explosion and a single panicle of fruit may be some days or even weeks in distributing its seeds. After the seeds have disappeared, the saucer-like disk and calyx, now hard and woody, remain on the plant for a long time. The little gray saucers held above the snow-clad earth are familiar objects to the winter wayfarer.

The New Jersey tea is valued in cultivation abroad and many hybrids between it and other species are said to have been produced in Europe. Its clean stems and strong dark foliage make it a desirable plant for lawns in America. It is especially good where a low hedge is desired, since the old stems cease growth at a certain height and new stems spring from their bases, the plant thus requiring no pruning. In other days it was often called red root from the color of the bark of the roots. In the absence of other dye-stuffs this bark was boiled with alum and yielded a cinnamon color. It was also used medicinally as an astringent and it may be added in passing that it comes of a medicinal family, *Cascara segrada*, the base of a well known patent medicine, being an illustrious member, while several others are nearly as famous.

In western America there are nearly forty other species of *Ceanothus* most of them beautiful plants when in flower. One—*Ceanothus divaricatus*—is known as the California lilac. This, as well as several other species, is also known as soap-bush from the fact that a good lather suitable for washing may be obtained from the flowers. The lather has an odor of birch or wintergreen and the plant is said to be an excellent substitute for soap. Botanists will recall the fact that the whole genus is allied to the Sapindaceæ or Indian soapwort family and so comes naturally by its saponaceous qualities. Our own plant, it may be said, is also faintly soapy, but in this case I have obtained a better lather from the young fruit than I have been able to obtain from the flowers, though they, too, possess the quality.

The best known appellation of our plant is derived from the fact that during the Revolutionary War, the dried leaves were used for tea. It may be doubted whether its use was confined to New Jersey at that time, but in some way the State and the plant have been joined in the name. According to Willis' "Practical Flora" the young leaves, collected and dried in the shade, furnish a beverage that is quite superior to the cheaper grades of Chinese teas, and the dried leaves have since become an article of local commerce in parts of Pennsylvania. The drinking of this tea is said to be on the increase.

IN A NEGLECTED GARDEN.

BY DR. WILLIAM WHITMAN BAILEY.

AFTER the long summer vacation, one's city garden is found to have relapsed into primitive wildness. It is indeed surprising how soon nature re-asserts her dominion. Some one has said that if New York City should be destroyed, in a few year's time its ruins would be covered with a forest of *Ailanthus*. We think we have conquered a field, when lo! in a moment of inattention the pig-weeds make a foray, and when we next go forth, stand in saucy pre-eminence.

Our back yard has for three months been un-visited by man, if we except the policeman who now and then rattled the kitchen blinds to prove that no one was in the front parlor. The plants have had the quadrangle all to themselves. There is, in consequence, every evidence of internecine strife,—

"The marigolds amidst the nettles blew,
The gourd embraced the rose-bush in its ramble;
The thistle and the stock together grew,
The hollyhock and bramble.

The bear-vine with the lilac interlac'd,
The sturdy burdock choked its slender neighbor
The spicy pink. All tokens were effac'd
Of human care and labor."

Asters have towered over golden-rods, only to be throttled in turn by the constricting bind-weed. They die, Laocoon-like, strangled in serpentine folds. The prehensile balsam-apple (*Echinocystis lobata*) has laid hold of everything within reach. Long trails of it hang on the clothes-lines; festoons droop from the fences; and high aloft on a peach tree are swinging ropes and cables. It is easy to see how, in a tropical forest, the lianes play so prominent a part.

In another corner of the yard the star-cucumber (*Sicyos*), cousin of the balsam-apple, and even more of a gypsy, has scaled the ash-bin. It has generous, heart-shaped, lobed leaves, and a prickly, uncanny, star-shaped fruit, the easily dislodged spines of which are as bad as those of a cactus. It is a vagrant which culture cannot reach. Balsam-apple is amenable to hospitality and adopts good manners. Not so, the *Sicyos;* it is a weed ever.

The pod of balsam-apple is a thing of beauty, symmetrical in form, pure in color, and when ripe, opening by the uncurling valves. The pendant capsule then allows the smooth, squash-like seeds to slide out wet with mucilage. These seeds I have always found very vigorous and never likely to fail in germination. The empty seed vessel is then skeletonized by the weather into a fairy basket. Both of these plants are extremely interesting to the student. As tendril climbers they have few superiors. Their wonderful performances have been chronicled by no less an observer than Charles Darwin. He evinced a personal interest in them.

We have a tall sun-flower to refute the poets, Tom Moore and the rest, by turning its back now and then upon the sun. Such things, no doubt, happen in the best regulated poetry. We must save the disk to ripen for the snow-birds, who in winter sometimes renew our sparrow-depressed hopes with thoughts of cheery creatures yet to come. For the naughty, pugnacious, cockney sparrows, who has a kind word? yet "it is their nature to!"

While our New England asters will not remain where we designed to have them, they are glorious anywhere in their panopy of purple. They are four or five feet in height—a home of happy bees. The honey-bees and some little wild fellows for whom we have no name, buzz over the flowers in company.

The paralellogram of fence-be-girt gravel which we style a garden, is indeed a study for a Gibson. Our neighbor has a grape-vine which, soldier as he has been, he fails to discipline. The green globes, "changing to amethyst," hang on our side of the fence, and we propose to claim them. To preserve the balance of power, the ***harmonium facultatis*** for our neighbor is also a professor, though not of botany), our blackberry, steals a march into his garden and disturbs his teutonic roots. Such are the amenities of nature!

The hollyhock, emulating the classic bean-stalk of Jack, aspires heavenward, decked out with red or white posies. These are silken pavilious ever open to troubadour bees. Grasses grow waist deep, and plantains make broad their phylacteries.

A stranger, visiting our yard, would consider it in frightful disorder. We, viewing it from another standpoint, pronounce that here is the reign of law. There is a conflict, earnest, even desperate, but the struggle, we are sure, is directed for the best.

Brown University, Providence, R. I.

THE SUBORDER BILABIATIFLORÆ OF THE COMPOSITÆ.

BY W. W. MUNSON.

IN Florida I gave myself the pleasure of hunting out that plant that constitutes the third suborder of the Compositæ, namely, the Labiatifloræ, a single species of a siugle genus—*Chaptalia tomentosa.* In southern California, too, there would be only the two suborders, Tubulifloræ and Liguliflora, but for a single species of the one genus *Perezia microcephala* constituting by itself the Labiatifloræ (or Bilabiatifloræ if you choose) of the Compositæ.

While the Florida plant is a stemless little thing growing in wet places, its wooly leaves and scape but a few inches high, the California plant has a stout stem as tall as a man, and grows in the blazing sunshine along roadsides and hill-sides as dry as if baked in an oven throughout its life except for a few weeks in early spring when it may have the benefit of a few showers. Its large, wavy lettuce-like leaves are as green and shinning, and its purple flowers nested in their hard solid involucres are as fresh as eastern asters are in September, except, to be sure, that some of the plants are maturing, the leaves drying and seeds scattering, because they are ripe, not on account of the drought.

While both these plants are humble and valueless, each in its own country, three thousand miles apart, occupies an important position in classification, for without them we would have only tubular and strap-shaped florets in the great order of Compositæ. I do not forget that some thistles have the limb of their florets so divided that the two lobes on one side are a trifle separated from the three on the other, but in *Perezia* the outer lip is only notched to three tiny points and the inner lip has two long lobes separated well down to the top of the tube. If there are any other members of the Composites with two-lipped florets in North America I would like to be informed of them.

Pasadena, Cal.

SELF-PROTECTION IN PLANTS.

Why are some plants armed with formidable spines? To the average person there would seem to be no particular reason for these objectionable adjuncts to plants. A true thorn is described as "a sharp-pointed woody structure which either terminates the twig, or is itself a short twig or dwarfshoot." This, however, merely explains the morphological aspect of spines and thorns. What we are concerned with is the part that spines play in the economy of plant-life. According to Luther Burbank the "Wizard of Horticulture," "Nature has wasted much energy on the spines of the cactus. I have," he goes on to say in an article in the *Century Magazine*, "simply helped her by taking away from her the necessity of producing them, and have left her free to put all her energy upon producing food. The cactus is now a definite food; it can be eaten raw or cooked; or preserved as ginger or melon rind, while the seed is the delicacy of the future. There is no reversion of the type, no degeneracy, no return to the coat of mail, but persistence in its new life and structure." These remarks refer to the production by him of a thornless cactus. And this is how he explains the process. "If we invite Mr. Thistle, or our Mr. Cactus, into our gardens, and patiently and earnestly teach and thoroughly convince him that all marauding animals shall be kept out, it will not be very long before some member of his tribe will see fit partly to discard some of the exasperating pins and needles, and put on a more civilized suit of clothes." He further goes on to explain that "it is a great effort on the part of the plant to produce all these spines, and when all this effort is made unnecessary, the plant will at once become more docile and pliable." From this it would appear that spines and thorns are not really necessary adjuncts to their lives. The homely way in which Burbank explains matters reminds us of the coats of mail used by the human race for purposes of protection. The necessity for these having passed away, civilized man now clothes himself in garments that are more suited to his modern civilized requirements.

It is a fact observed by several investigators that plants in domestication lose much of their spinous armour. There are, for instance, several varieties of roses in cultivation that are absolutely thornless. Among what are called "hybrid perpetual" roses there are several such; while others present very formidable thorns. The reason for the latter class is possibly the crossing of some variety whose ancestors were aggressively thorny, with another of the same descent, and the taint of spines comes out very strongly in the resulting hybrid. In the case of other plants, such, for instance, as the acacias, the spines are apparently intended as a protection against the "marauding animals," referred to by Burbank. Most cud-chewing animals have a weakness for *Acacia* leaves, and but for the spines, would be devoured out of existence. Many other members of the great leguminous order are spineless, the albizzias, for example. Being large trees, they are not liable to the attacks of the said "marauding animals," and therefore have no necessity for spines or thorns. Most shrubs and tree-shrubs armed with spines are natives of regions not naturally endowed with a rich vegetation, hence more liable to the attacks of animals seeking fodder. Were it not for the protection of thorns many forms of plants would have become extinct. For instance, cycads, zamias, macrozamias and that rare African plant, *Welwitschia mirabilis*, would now have been extinct but for the armour provided for them by nature. In a recent issue of the *New Phytologist* Dr. L. Cockayne discusses the "significance of spines in *Discaria Toumatou*." A novel view of the significance of spines is here presented, which is entirely at variance with the generally accepted theory. This particular plant is a xerophytic (desert) shrub, known among colonists of New Zealand as the "wild Irishman." It is chiefly remarkable for being abundantly furnished with rather long and very pungent spines, which are in fact shoots of limited growth capable of assimilating carbon dioxide. The characteristic stations of this plant are: stable sand-dunes, stony plains, river-beds and terraces; dry, frequently clayey hillsides, and slopes of stony debris, or even rock-faces. In some places the plants are isolated; in others they form dense thickets, unpleasant to penetrate. The terete spines are arranged decussately at distances of about two cm. and measure two cm. to three cm. in length and one mm. to two and one-half mm. in diameter. The early seedling form is quite without spines, being an erect, leafy plant. After attaining a height of several centimeters, probably varying considerably according to environment, spines commence to be developed from the axils of the leaves as in the adult, and the plant thenceforth becomes by degrees comparatively leafless and very spinous. The juvenile leaves are very similar to those of the adult, but are thinner and the earliest leaves are toothed. Dr. Cockayne carried out an experiment with this plant which is most interesting. He says: "Two seedlings artificially raised from seed in a greenhouse, after developing one or two spines, were placed by me more than three years ago in a glass case, so constructed as to keep the inside atmosphere constantly saturated with moisture, in order to see if the plants would continue to produce spines; i. e., if this artificial environment would inhibit the formation of spines. The conditions provided would not only expose the plants to moist air, but the light would be considerably more feeble than that of the normal stations of the *Discaria*. Such conditions, indeed, would be those of a rain-forest interior rather than a plain or hill side in the open, however wet the climate. After being placed in the moist chamber, the plants developed no more spines, and are now seedling plants in all respects except for the few spines which were developed prior to the culture in moist air. Moreover, it seems evident that such plants would remain in the seedling form so long as they were kept in an atmosphere constantly moist and exposed to a feeble light. That spines in xerophytic plants are an adaptation against the attacks of grazing animals is a matter of such general belief as to be admitted into certain botanical text-books as a proved fact. It seems, however, to me that my experiment, detailed above, is a fairly crucial case, and that in *Discaria Toumatou*, at any rate, the spines are a direct response to conditions of dryness, and function as a special contrivance for checking transpiration. If so, then they have nothing to do primarily with attacks of grazing animals, especially when it is borne in mind that New Zealand never contained such, excepting the various species of *Moa*." This, of course, is one view of the question; but it is doubtful whether it would hold good in the case of the stinging nettle, for instance. Would the stinging hairs of the nettle become eliminated under other conditions? Then, again, why should the *Datura* be armed with such ferocious thorns, seeing that its leaves, stems and fruit contain a deadly poison. That the thorns are intended as a protection against *some* form of external attack seems certain The disagreeable odour given off by some plants on being touched is probably intended as a means of protection against attack. In fact, the instinct of self-preservation would seem to be as pronounced among plants as in animals, and environment probably plays as important a part in the case of plants as of animals.—*Indian Planting and Gardening.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

NECTARLESS FLOWERS AND BEES.—Because most bees are fond of nectar, it is often hastily assumed that bees visit the flowers for this sweet liquid, only. The fact is, there are many bees as fond of pollen as others are of nectar. The individual pollen grains possibly appear to them as apples and oranges do to us. The honey-bee might also be called the pollen-bee, for it is equipped with regular baskets on its rear pair of legs for carrying home pollen. By watching the bees on the flowers one may see them scooping the pollen from the anthers.

POLYPODIUM FIBRE.—Growers of orchids often make use of a potting material made from the rootstocks of the bracken (*Pteris*) or the cinnamon ferns (*Osmunda*), and now, according to an advertisement in *The Gardening World* an enterprising inhabitant of Germany is offering polypodium fibre, made from the rootstocks of the common polypody (*Polypodium vulgare*) for the same purpose. The bracken and cinnamon ferns often grow in such quantity that the use of their rootstocks as potting material is scarcely likely to cause them to be exterminated, but if polypody fibre ever becomes the fashion in this country we may soon expect to place the *common* polypody among the rarities.

CLEOME.—In two of my botanizing trips I saw albino forms of the commonly called skunk-weed (*Cleome serrulata*). I also saw large numbers of the sphinx moth flitting from one flower-head to another. I have wondered whether these are not the principal agents in securing the cross-pollination of this plant, in which the anthers extend far beyond the corolla.—*Earl Lynd Johnston, Evans, Colorado.*

MAKING A NEW VARIETY.—A gardener writing to *The Gardening World* says tbat his employer told him he knew how new varieties of sweet peas were made. He said all that was necessary was to take a male and female seed, split each exactly in half and then carefully join a half from each seed. This would invariably bring a new variety when planted. Coming from his employer the gardener hesitated to correct the statement, but the incident serves again to show that "it is better to know less than to know so much that is not so." We have often been informed that weeping trees are made by cutting off the tops and grafting them on the stocks upside down!

VARYING SIZE OF JACK-IN-THE-PULPIT.—One of my students lately brought in a specimen of *Arisæma triphyllum* which I regard as unique. The complete plant, including corm, leaf and spathe, is only three inches in height. It seems in every way typical except in the matter of size. The very small preacher is as "perky" as any of his larger co-religionists. We wonder if his sermons are shorter! Many years ago good old George Hunt and myself once found in Lincoln, R. I., a plant the direct antithesis of this one. As near as I can recall, it stood four feet high, and the stalk was an inch in diameter. It was richly mottled. The spathe and spadix were as large as those of an average hot-house *Richardia* or *Calla*. It was growing in deep, black loam or muck. I have learned nothing of the environment of the little Jack, surely a most precocious member of the Jacobæan fraternity.—*William Whitman Bailey, Brown University.*

THE FERN AS AN AUTUMN LEAF.—One does not usually think of ferns as playing a part in the color display of the autumnal foliage, but at times they do give a strong color tone to a landscape. On a trip to Atlantic City, N. J., one September day, the train passed through acres of bracken, woodwardia and ormundas, whose changing color made a gorgeous tapestry in yellow, orange and warm reddish brown upon the floor of the open barrens.—*C. F. Saunders.*

REGENERATION.—This is the term applied to the process in plants and animals by which lost parts may be regained. If the lobster loses a claw or the star-fish a ray, these parts slowly grow out again. Similarly, the roots of many plants if separated from the shoots, will develop new shoots, while the shoots or stems of nearly every species will develop new roots under proper conditions if the old ones are lost. A similar faculty allows certain leaves to produce young plants on the edges and the like. Various theories have been advanced to account for regeneration but up to the present no satisfactory explanation of the way in which it is brought about has been given.

FADELESS FLOWERS.—The prominence given by the daily press to Luther Burbank's alleged creation of a fadeless flower has caused many well informed people to imagine this performance to be more wonderful than it really is. It is safe to say that no experimenter will ever produce a fadeless lily or rose, but when one has a fadeless flower to begin with the "creation" of an improved variety is not more wonderful than many another performance of the gardener. Probably every reader of this magazine have seen fadeless flowers. There are several in the American flora to which have been given the fanciful names of moonshine, pussie's toe, ladies' tobacco, mouse-ear plantain and the like. The *Gardening World* recently mentioned some of the important genera containing fadeless flowers, among which we note *Athanasia*, *Acrolinium*, *Amaranthus*, *Rhodanthe*, *Waitzia*, *Ammobium* and *Antennaria*. The Edelweiss of the Alps belongs to this category of fadeless blossoms.

French Plants for Exchange.—M. C. Belhalte, curator of the herbarium of Prince Roland Bonaparte, 10 Avenue d' Jena, Paris, is desirous of adding to the herbarium, lacking specimens of the medicinal, edible and useful plants of other countries, and offers duplicate plants from the herbarium, books, etc., in exchange for such specimens as he may want. Many of the plants wanted are cultivated or common, such as *Coptis trifolia*, *Sarracenia purpurea*, etc. A list of the plants desired may be had by addressing the curator. Those interested in the plants of other countries will find this an excellent opportunity to acquire them.

Golden Glow.—A short trip along almost any street is likely to convince one that there are fashions in flowers. The crimson rambler rose and the golden glow rudbeckia are examples. This latter plant has already outstripped the rose in numbers if not in popularity, due to the rapidity with which it increases. It is possibly not known to many that the original of the golden glow may be found along shaded streams throughout eastern America. It is, of course, not double, the difference between the wild and cultivated plant being this superabundance of yellow rays. Without doubt there are many other wild plants that will yet be bred up into forms capable of leading the fashions in other years.

Black Nightshade Edible.—A dealer, who recently sent out seeds of the black nightshade (*Solanum nigrum*) under the name of garden huckleberry, has caused considerable comment by announcing that the fruits of this plant are edible and excellent for jams, pies, etc. Specimens submitted to the United States Department of Agriculture, were, however, pronounced perfectly wholesome when ripe but unsafe and probably poisonous when green. Although this information is surprising it is in line with conditions that prevail in the nightshade family in general. The potato, tomato, egg plant and others whose fruits are perfectly harmless, are known to contain a poisonous principle in the foliage or green fruits.

THE MEADOW LILY.—Referring to the bi-colored meadow lily (*L. Canadense*) it is interesting to note that dealers in bulbs distinguish the two colors by calling one *Lilium Canadense flavum* and the other *L. Canadense rubrum*. In scientific practice, however, both form names are not necessary. The color first described would be considered the species and the second would have a form name to distinguish it. Similarly the wake-robin ought to be called *Trillium erectum rubrum* or *Trillium erectum album* according as the flower varies.

LONG-LIVED SEEDS.—Twenty-five years ago Dr. W. J. Beal buried seeds of various weeds and at intervals since has dug some of them up to test their vitality. As might be expected some kinds failed to grow long ago, but a few have continued to germinate and now at the end of twenty-five years one may still obtain plants of pigweed (*Amaranthus retroflexus*), black mustard (*Brassica nigra*), pepper-grass (*Lepidium Virginicum*), evening primrose (*Œnothera biennis*), purslane (*Portulaca oleracea*), chickweed (*Stellaria media*) and several others. The experiments need to be carried further to determine the maximum length that seeds will retain their germinating power. We recommend the experiment to our younger readers. Older ones might find themselves in the position of the man who, hearing that parrots live to be two hundred years old, bought one intending to keep it and find out for himself.

COLOR OF FLOWERS AND LOCALITY.—In addition to what was said recently about the way in which the red trillium and meadow lily change color with change of locality, it may be noted that Kerner in the "Natural History of Plants" gives several instances of this kind. In the Alps a bellwort (*Campanula trachelium*) has white flowers in one district and blue in another. The long-spurred violet (*Viola calcarata*) has blue flowers in one locality and yellow flowers in another. *Astragalus vesicarius* is yellow in the Tyrol and violet in Hungary. *Melittis melisophyllum* has white flowers in the southern

Tyrol and in lower Austria and Hungary they are purplish. The alpine poppy (*Papaver alpinum*) on the slopes of the Austrian and Styrian Alps is white, on the southeastern Alps it is blue. In the central Tyrolese Alps the alpine anemone (*Anemone alpina*) has sulphur-yellow flowers, in the eastern Alps they are white. It does not seem known, as yet, what causes these changes. The whole matter would form an excellent subject for investigation. Kerner seems to be of the opinion that the colors are adapted by the blossoms because they contrast most strikingly with other species in their vicinity but this seems a rather fanciful theory.

PLANT DISTRIBUTION.—This week I noticed an interesting example of plant distribution in that of several mullein plants growing in an old unused stable lot. I was surprised as I have never seen mullein as far west as Colorado, in fact, these are the first I have seen since leaving Ohio. The sight of them so aroused my curiosity, that I questioned the owner of the lot, an Ohio man, also who has resided in Colorado for more than thirty years, and found that they had been there a number of years, some having matured seed. He had carefully taken care of the first plant he noticed because they made him think of his boyhood days. The following questions arose in my mind: How came these here? Why aren't there more plants since the time of the first plant's appearance? And why do they not spread? In questioning the man further he observed that the seeds probably were carried by sheep, for, as he said, we always associated mullein with sheep in the pasturelands of Ohio. Is this a likely explanation? This one spot seems to be the only congenial place for them as several persons in the neighborhood have transplanted some without being able to make them grow. I should like to hear from western botanists, especially from those residing in Colorado, as to whether or not this is an unusual occurrence.—*Earl Lynd Johnston, Evans, Colo.*

Editorial.

According to Dr. Sargent's new manual there are nearly six hundred and fifty kinds of trees in North America, and among these there are ten birches, eleven hickories, eleven poplars, thirteen maples, sixteen ashes, eighteen plums, twenty-one willows, thirty-four pines, forty-seven oaks and *one hundred and thirty-two* hawthorns. Those who have been following the hawthorn craze may well pause and ask themselves whether they believe that the American hawthorns actually outnumber all our ashes, plums, willows, pines and oaks put together. In our opinion it would be possible to describe as many maples, plums or willows as there have been described hawthorns by taking similar characters into consideration.

* * *

Among the other commendable acts performed by the Vienna Botanical Congress was the voting to exempt from the rules of generic priority a list of more than four hundred names that have been buried in recent years by certain radical systematic botanists. During the past ten years we have reluctantly witnessed the ruthless deposing of such good old names as *Sequoia*, *Narthecium*, *Spiranthes*, *Maclura*, *Fagopyrum*, *Dicentra*, *Corydalis*, *Petalostemon*, *Wistaria*, *Desmodium*, *Shepherdia*, *Mertensia*, *Vernonia*, *Mikania*, *Liatris*, *Cnicus* and *Pycnanthemum*, and we hail their restoration with more than ordinary delight. The business of putting back the old names, however, is going to reduce various recent botanical reputations to positions dangerously near to synonyms. Take away all their advertising in the way of citations after new combinations and their impress on botany will be but a memory, a shadow, or a dream. Thus is frustrated the attempt of some of the moderns to go down the ages, hand in hand with Linnæus, at the tail end of a Latin botanical combination. A great deal of botanical literature has appeared with the new nomenclature and this will now lose a large part of its usefulness until other editions in accord with the rulings can be produced.

BOOKS AND WRITERS.

It would be difficult to find a book on the work of plants in which is packed more information than is to be found in Osterhout's "Experiments with Plants." To those who are not already familiar with the way in which plants secure and store their food, with their methods of respiration and digestion, with their reaction to various stimuli—in short with all the phenomena of the growth and behavior of plants, this little book ought to prove the most absorbing literature; while to the teacher of botany the great variety of experiments for illustrating or observing such phenomena will appeal very strongly. We note with pleasure that the author has aimed at making the experiments with the simplest apparatus possible and nearly all of them could be performed with the implements and utensils of an ordinary kitchen. One notes many ingenious contrivances among the two hundred and fifty illustrations. The text is clearly written and in addition to directing how to perform the experiments gives the usual information on the subjects investigated with much more of an interesting and valuable nature besides. (New York, The MacMillan Co., 1905, $1.40.)

After all the books dealing with our wildflowers from various standpoints it would seem a pretty difficult thing to make a new book on the subject without traversing ground already gone over, but this has been done by Maude Gridley Peterson in her "How to Know Wild Fruits." Heretofore the point of attack in identifying plants has been the flower and the fruit has received but secondary attention, but late in autumn when flowers are scarce and every lane and hedge-row is laden with fruits of all sizes and colors, the rambler is likely to sigh for a book that gives especial importance to the identifying plants from their fruits. This Miss Peterson has supplied. The descriptions begin with the fruit, but includes descriptions of the flowers, leaves and other parts also, and the rather difficult key is of course based principally on fruit characters. There are about one hundred illustrations in black and white and one colored plate. About two hundred species are described, about all, it may be said, that are conspicuous in our northern flora by reason of their fruits. This will be an excellent handbook to go with your favorite manual for naming the plants from their flowers. (New York, The MacMillan Co., 1905, $1.50 *net.*)

There is a familiar look about Atkinson's "College Botany" due to its resemblance to the author's earlier "Elementary Botany," but an examination of the new work shows the resemblance to be superficial only. The earlier work has been rewritten, re-arranged and greatly increased in extent and now under the new title is one of the best single-volume botanical text books to be found. The work is arranged in five parts which are dominated by Physiology, Morphology, Ecology and Taxonomy in their order. An unusual amount of space has been given to the relation of the plant and its parts to its surroundings and throughout the book subjects that are often passed with a mere mention in other works are discussed at length. A very commendable feature is the series of tables of the classes, orders and families from algæ to the highest flowering plants. The illustrations have also been increased and now number nearly six hundred. The only bad feature of the book comes from the use of these illustrations which (many of them being from photographs) require the use of coated paper and thus add greatly to the weight of the book. The text is accurately and clearly written and covers upward of seven hundred pages. It will prove of great usefulness to teachers as well as to students of botany. (New York, Henry, Holt & Co., 1905, $2.00.)

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Professor of Botany in the University of Amsterdam.

EDITED BY DANIEL TREMBLY MACDOUGAL

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VOL. 9. NOVEMBER, 1905. NO. 5.

THE AMERICAN BOTANIST.

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BINGHAMTON, N. Y.
WILLARD N. CLUTE & CO.

THE AMERICAN BOTANIST
A MONTHLY JOURNAL FOR THE PLANT LOVER.
Issued on the 15th of Each Month.
WILLARD N. CLUTE, - - - EDITOR.

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WILLARD N. CLUTE & CO., Publishers, Binghamton, N. Y.

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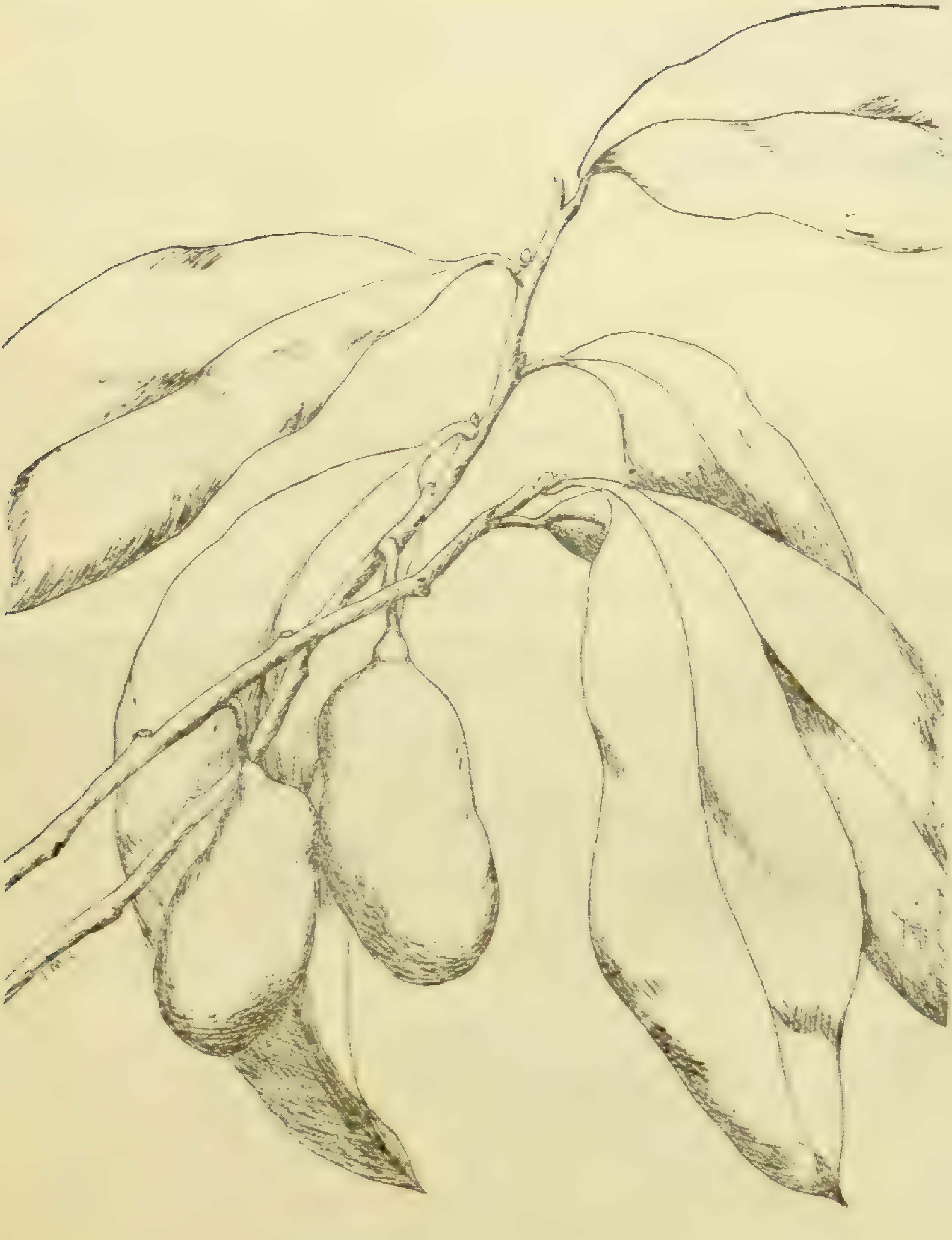

THE PAPAW FRUIT.

THE AMERICAN BOTANIST.

VOL. IX. BINGHAMTON, N. Y., NOVEMBER, 1905. No. 5.

THE FRUITING OF THE PAPAW.

BY WILLARD N. CLUTE.

IT IS well known that the papaw (*Asimina triloba*), though producing several pistils in each flower, rarely sets any considerable number of fruits. It seems to be an exceedingly rare occurence for any flower to produce more than a single fruit, and by far the larger number of flowers, at least near the plant's northern limit, fail to produce fruit at all. Something similar occurs in the case of the milk-weed which after a great display of flowers can usually show not more than two or three seed-pods.

The milk-weed's lack of fertility is supposed to be due to its specialized method of pollination which is successful only in rare cases, but the papaw is pollinated much as ordinary plants are and one would think might even be self-pollinated were it not that the pistils are somewhat longer than the stamens. The stigmas appear, however, to ripen a trifle earlier than the anthers and this with the difference in length points to the conclusion that the flowers are adapted for cross pollination. If this is true, we reasoned, the lack of fruits might be due to the absence of the proper insects for the transfer of the pollen. Desireing to test this theory, we cross pollinated a large number of flowers by hand, last spring, and were pleased to find that the theory appears to be correct. In many cases half a dozen or more fruits started from a single blossom. None of these, however, continued to maturity, but dropped from the plant when not more than an inch in length. Whether the shrub lacked the vitality to bring them to maturity, or whether the pistils were not adequately polinated remains to be discovered another season. That a lack of proper insects for pollinating the flowers is at the bottom of the matter is shown by the fact that none of the blossoms that were not artificially pollinated, produced more than a single fruit

Single fruits were rather common this year in northern Illinois, and we noticed quantities for sale on the fruit-stands of Chicago. The fruit seems rarely to ripen on the shrub, but may be found among the fallen leaves still hard and puckery to the taste. After lying for a time, however, they begin to soften and gain in sweetness the change being due, no doubt, to the digestion of the starches and other substances by a vegetable ferment, as in the similar cases of the banana and persimmon.

Joliet, Ill.

METAMORPHOSIS.

BY DR. WM. WHITMAN BAILEY.

IT is not popularly known, though men of science are well aware of it, that the poet Goethe had a profound influence upon botanical theory. One at all familiar with the philosophic discussion in "Faust" and other of his works, is not surprised at this. He was, to be sure, not always equally happy in his interpretations of nature. His theory of optics, for example, is still held to be absurd, but with the poet prescience, he saw far ahead of his time, and with very lucid vision. To him we owe the generally adopted theory of the flower, which goes to show that it is a metamorphosed branch, the lateral members of which are, therefore, leaves. This refers then all the floral organs, however diverse in appearance, to a foliar origin. It does not claim that any particular flower has, at some time in the course of its development, existed as an ordinary branch, but that a branch which would under ordinary conditions have some green leaves, has been set apart, "metamorphosed" is Goethe's word, to do the work of reproduction. To-day the theory is modified and extended and the claim made that all parts of a plant are morphologically to be referred to one of several factors, viz: root, stem, or leaf. This rule is the key to many a puzzle; position, rather than function, determining the nature of the object under discussion. Thus, a leaf may function as a branch, or a branch as a leaf; a portion of a leaf as a tendril or spine, or a branch of the same.

Goethe came to his conclusion at about the same time that the botanist Wolf independently worked at the same idea. Both worked on double flowers, like roses and carnations. It is indeed, easy to see in such cases that certain important portions of the flower have reverted to leaf forms. Often, indeed, the change goes farther, and they even become green. Again, in pond lilies we note a series of almost imperceptible gradation from the sepals to the stamens. Nothing can be more instructive than these conditions, normal or abnormal, when viewed in this light of constructive metamorphsis.

Brown University, Providence, R. I.

FROM THE MOUNTAINS OF NORTH CAROLINA.

BY EDWIN D. McHOSE,

IT has been said that no section of our country covers such a large range of species and offers such delightful surprises to the botanist as does the mountain region of North Carolina. Perhaps the sand regions near Chicago boasts of a greater variety in a small area, but the headwaters of the Tennessee, the Broad and the Swannanoa rivers, water an area that is probably unsurpassed for its variety of species and of landscapes. There is a profusion of both.

In the mountains is found the flora of our northern states and in the lowlands the flora peculiar to the South. The large mountain laurel for example. (*Kalmia latifolia*) grows in dense thickets and even reaches a height of twenty feet. It is also abundant here in Pennsylvania in the mountains.

I have had a desire for some time to gather the *Sabbatias* but was told while in Asheville that one could hardly expect to find any in that section. While botanizing up

Sunset Mountain, near Asheville, I saw what at first I decided to be *Phlox* some of which I had just gathered, and yet I was not sure but kept turning around to look at the pink corollas and suddenly the thought flashed: Might they not be *Sabbatia*? They were—*Sabbatia angularis* as I determined a few days later at the Biltmore Herbarium.

This Herbarium is a part of the vast estate, which is said to include 140,000 acres owned by Mr. Geo. Vanderbilt.

In that region of floral wealth, the Herbarium is a valuable institution, where the collector can stop to determine difficult species and where the southern flora is rapidly being catalogued. Though only in existence ten years, there are no less than 50,000 sheets. Mr. C. D. Beadle who is at the head of the forestry department of the estate is a specialist on the genus *Cratægus*. In a recent number of the "Biltmore Botanical Studies" he published twenty one descriptions of as many varieties of that genus. Messrs. F. E. Boynton, C. L. Boynton and T. G. Harbison are associated with Mr. Beadle in botanical research. The Herbarium is equipped with an excellent botanical library of over 2,000 volumes. Among the very valuable reference works are the 122 Vols. of *The Botanical Magazine*, from Vol. I, published in London in 1793, to the latest monthly. The coloring of the first volumes is not surpassed by the most up to date methods of printing colored plates—the colors of plants pictured in Vol. I are not in the least faded that one can see.

The Herbarium rendered good service to all plant lovers in the matter of the Stephen Elliot collection. For lack of attention and care, the specimens were being destroyed by time and insects in a Charleston college. Mr. Beadle got permission to bring the collection to Biltmore where it is being put in order, properly catalogued and fumigated until the college can furnish better quarters for it. I dare say there is no institution in the South that is doing as much for the science of botany as is the Biltmore

Herbarium. Its interests are purely scientific and Mr. Vanderbilt is to be congratulated on its growth and its work.

Schuylkill Seminary, Reading, Penn'a.

INSECT GALLS.

BY FRANK DOBBIN.

THE insect gall is a familiar sight to the rambler in the autmun fields. On twigs and leaves of the oak, the willows, the wild rose and the stems of golden rod, one cannot fail to notice these peculiar growths. That they are abnormal growths is at once apparent.

One of the most familiar is that enlargement of the stem of the golden rod just below the flowers, known as the golden rod ball gall (*Trypeta solidaginis*, Fitch). The balls are usually about an inch in diameter and have a pithy inside with a rounded cell in the center containing the larva. Sometimes as many as three are on a single stem. There are two other common golden rod galls: The bunch gall (*Cecidomyia solidaginis* Loew) which is produced by an arresting of the stalk, causing the leaves to accumulate in a large bunch at the end, and the side gall (*Trypeta polita* Loew) caused by the arresting of the side branches on which accumulates a small bunch of aborted leaves. Near the base of this bunch is the hollow in which the larva lives. This form is usually found on stalks of *Solidago altissima*.

The different species of wild rose have several forms of galls. One of the most common of these being the mealy gall (*Rhodites ignota*). These have a rounded woody body covered with a white mealy substance. Sometimes two or three grow together making a body nearly as large as a walnut but usually they are only about the size of a pea. They are found on the leaves. Another to be fonnd on the twigs of the wild rose is the spiny gall. (*Rhodites bicolar*) a small body one-half inch or less in diameter covered with long prickly spines. It is yellowish green in summer and brown in winter. The common cinquefoil

(*Potentilla Canadensis*) furnishes a curious little gall in the axils of some of its leaves. It is about the size of a large pea, green in summer and brown in winter.

The gall flies seem to be partial to the different species of the oak, for not only the leaves but the twigs of these trees are made the receptacle for their eggs and in time produce the cradle for the larva. Everyone has picked up the common oak apple (*Amphibolip confluentus*), which grows on the red oak and nearly related species. It is sometimes filled with a spongy substance in the center of which is a hard kernel containing the cell. Another gall very similar in appearance grows on the leaves of the scarlet and red oaks. It is somewhat smaller and when broken appears to be empty. If broken carefully, however, it will be seen that the larvel cell is kept in its place in the middle by means of some stiff radiating threads or filments. It is known as the empty oak apple (*Amphibolips inanis*). I once saw a large oak near Newburyport. Mass. on which were thousands of these galls with thousands more fallen to the ground beneath. A whole swarm of flies must have attacked this tree at once.

The so-called bullet gall (*Holcaspis globulus*) is common on the terminal twigs of the white oak. A round hard body sometimes three-fourths of an inch in diameter. It is yellow or reddish in summer but brown and hard in winter. On twigs of the swamp white oak (*Quercus plantanoides*) there occurs another bullet gall (*Holcaspis duricaria*), which is very similar in appearance to the preceeding. It has a sharp little point on the end and for this reason is called the pointed bullet gall. The oak petiole gall (*Audricus petiolicola*) is common at the base of the midrib on leaves of the white chestnut, swamp white and post oaks. It is a hard irregular woody growth about three-fourths of an inch long and contains several cells.

The gall-gnats, a family of small flies, are responsible for many galls some of which are found on willows. One the egg gall (*Euura ovum*) appears as an elongated nodule on twigs of willow growing in swampy places. Sometimes a row of three or four will be found on the same twig. Another one common on willows is the club gall (*Cecidomyia rigidae*) which is an enlargment of the stem tapering to a point. It usually has several small terminal buds growing from it. The pine cone gall (*Cecidomyia strobiloides*) is a conspicuous object on low willows after the leaves have fallen. It is about an inch in diameter composed of many imbricated leaves in the form of a cone. I am told that this gall was once considered a characteristic of the plant and the willow received a specific name in consequence. It is now known that these galls occur on several kinds of low willow. The willow galls, if cut open, will be found to contain a bright colored maggot. That of the egg gall being pink and that of the club gall a dark red.

Only a few of the more common galls have been mentioned here. They may be looked for on the basswood, elm, poplar, ash, alder, witch hazel, sumac, hickory, honey locust, wild cherry, grape, tulip tree, hackberry, huckleberry, wild lettuce and touch-me-not. In fact over eighty different galls are known to occur in the eastern part of this country.

Shushan, N. Y.

TROPICAL FRUITS.

NATURE is at her best in the tropics. It is here that vegetation grows most luxuriantly, that the flowers reach their greatest size and most brilliant coloring, and that the fruits develop the most unusual shapes, odors and flavors. With some of these fruits, such as the fig, date, pineapple, orange, lemon, lime and banana we are so familiar that we may fall into the error of supposing that these are the only fruits worthy of the name to be found in the warmer parts of the world; on the contrary the fruits are as abundant and as varied as the flowers, and many of them are certain to prove palatable to people of more temperate regions, but their perishable nature prevents their appearance in markets nearer the poles except occasionally as curiosities.

It is possible, however, for the term tropical fruit, to be a misnomer, for there are many regions within the tropics where pears, peaches, plums, cherries, grapes, strawberries and other small fruits familiar in temperate gardens grow and fruit abundantly. We must remember that while temperature constantly decreases from the equator to the poles, it no less steadily decreases from sea level to the tops of the mountains even at the equator. Thus it happens that one may find in tropical markets, fruits regarded as typical of temperate regions neighboring those that can only be produced in warm countries. In cold regions, by means of hot houses, man may coax the warm country plants to fruit, but in the tropics, nature often plays into the hands of the cultivator by producing a cool and elevated region close to one that is strictly tropical in the ordinary sense of that term.

Not all of us can visit the tropics, but there is a certain fascination in reading about the strange fruits there produced. The very names of many of them are strangers to our ears, and while the names of others may have been made more familiar by works of travel, the fruits themselves would be no more easily recognized. A list of the fruits that are commonly cultivated in Ceylon was recently given in *Indian Planting*, and from this we extract, with some additional remarks, some of the most interesting examples.

After the fruits commonly exported from the tropics to temperate regions, must be mentioned the mango (*Mangifer Indica*) which in its season forms a large part of the native diet. It is borne on trees of medium height which resemble the magnolia in habit. The fruits are borne in clusters on long stalks and are about the size of a large peach. Most mangos have a terpentine like flavor that at first is a bar to the enjoyment of the fruits. There is a single large stone in the center covered with long fibres, much like a cotten seed is. The mangosteen (*Garcinia man-*

gosteen and the durian (*Durio zibathinus*) are two fruits that natives of the tropics usually value more highly than any other fruit; indeed the mangosteen is often called the most delicious fruit in the world. The durian, though possessing a disagreeable odor, is regarded as nearly its equal in flavor, and is greedily eaten by all sorts of animals. The jack fruit (*Artocarpus integrifolia*) is another large fruit with an exceedingly disagreeable odor that is pleasing to most palates if the odoriferous morsel can be gotten past the nose, The jack fruit is the nearest relative of the bread fruit (*Artocarpus incisa*) and both are as large as a man,s head or larger.

The sour sop (*Anona muricata*) the bullock's heart (*A. reticulata*) the custard apple (*A. squamosa*) and the cherimoyer (*A. cherimolia*) are a group of related fruits that find favor throughout the tropics. The trees that that produce them are of medium size, not unlike peach trees in habit, though the fruits of most are much larger than peaches. The fruits are heart shaped and contain a soft custard like pulp. The trees are natives of the West Indies.

The names of the guava (*Psidium guyava* and *P. cattleyanum*), persimmon (*Diospyros kaki*), pomegranate (*Punica granatum*) avocado or "alligator" pear (*Persea gratissima*) and the papaw (*Carica papaya*) are familiar to all readers of articles on tropical botany, and all but the last may be found during the season in the markets of the larger cities in temperate regions. The persimmon, pomegranate and alligator pear, especially, are steadily gaining favor in America. The papaw is not related to the native North American tree by that name. In appearance it has considerable resemblance to a large castor-oil plant (*Ricinus communis*) and is usually to be found in any large conservatory. The large melon like fruits are the source of a vegetable pepsin.

Less familiar, perhaps, but well known to all visitors to the American tropics, at least, are the rose apple (*Eugenia jambos*), loquat (*Photinia japonica*), tree tomato (*Cypho-*

mandra betacea) and sapodilla (*Achras sapota.*) The loquat, as its name indicates, is a Japanese tree of medium height, belonging to the apple family. Its fruit resembles the crab-apple but differs in flavor. The rose apple is also a medium sized tree with white and rose-tinted fruits as large as an egg, containing a sweet snow-white pulp. The fruits of the tree tomato may be likened to goose-berries though they are as large as the largest plums. They are used fresh or preserved and in the West Indies are known as vegetable mercury from their action on the liver. The sapodilla is also called the naseberry. It is an oblong fruit like a large peach, brown in color and full of a granular sweet pulp.

Other names in the list from which we quote are entire strangers to the writer but the descriptions sound attractive enough to make one wish for an opportunity of testing their qualities. The rambutan (*Nephelium lappaceum*) is noted as a large spreading tree with bur-like, yellowish red fruits which contain a pleasantly acid white aril around the seed. This is evidently a relative of the chinese nut or litchee (*N. lichi*) found so commonly in our fruit stores, if indeed it is not the same thing under a different name. The Brazil cherry (*Engenia Micheli*) has bright red, tomato-like fruits that are acid and slightly aromatic. This is another fruit of the rose apple family. Related to the mangosteen but less valued is the Cochin goraca (*Garcina Xanthoscymus*) with very acid, yellow, apricot-like fruit. The uguressa (*Flacourtia Rammontchii* var. *cataphracta*) is discribed as a thorny tree bearing large dull red or purple berries and an allied species the lovi-lovi (*F. inermis*) bears bright red, very acid cherry-like fruits. The Kamaranga (*Averrhoa carambola*) with juicy winged fruits the nam-nam (*Cynometra*) *cauliflora* bearing short thick juicy pods on the trunk, the Ket-embilla (*Aberia Gardneri*) with purple velvety fruits like gooseberries, the Kei apple (*Aberia cafflra*) and the Davidson plum (*Davidsonia pruriens*) are among the other fruits that are names only to those of temperate climates.

It is doubtful if the carobs or locust beans (*Ceratonia siliqua*) would be ordinarily classed with the fruits but they are certainly entitled to a place. The husk or pod is the part eaten. It is used mostly as a food for cattle' but it also form a part of the native diet and are to be found in a large number of American fruit stores, often under the name of St. Johns Bread. To the same family belongs the tamarind (*Tamarindus Indica*) which looks like a large locust tree and bears red-brown pods like bean-pods in which is a very acid pulp.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

THE NUMBER OF CULTIVATED PLANTS.—It is estimated that less than a thousand different species of plants are cultivated for food in various parts of the world. The real staples, however, like rice, corn, and potatoes make up less than one quarter of this number.

VITALITY OF WILLOWS.—We are all more or less familiar with the fact that willow twigs will take root and grow if given half a chance but a rarer phase of the subject has recently come under the editor's notice in which a large branch split from the main trunk in such a way as to still remain in position, had sent out an abundance of roots from the injured surface. These penetrating the moist space between branch and trunk have finally reached the ground, a distance of four or five feet, and there taken root, thus providing the supply of moisture that was interupted when the branch was broken.

VALUE OF FRUITS AS FOOD.—A writer in a recent number of *The Lancet* maintains that fresh fruits materially aid the body in taking up iron. Much of the iron in our food is said to be insoluble and therefore not assimilated but by the action of fruit acids malates, citrates, etc. are formed in which form the iron can be used.

MEADOW LILY.—Mr. Leston A. Wheeler, Jamaica, Vt. writs that all his meadow lilies (*Lilium canadense*) are yellow. This is apparently the state of things throughout most of New England. There are occasional reports of red lilies, but these are possibly turk's-cap lilies (*L. superbum*) mistaken for meadow lilies, It is also noticeable that the turk's-cap lilies do not appear to change color with the locality. They appear to be red whether growing in New England or New York. Greater mystery thus attaches to the change of color in its relative. If any of our New England readers have found yellow turk's-caps, we would be glad to hear from them.

BLACK NIGHTSHADE BERRIES EDIBLE.—The note on page 75 of the October number of the *Botanist* reminds me of an incident which occurred in my class in Botany nearly thirty five years ago. I was lecturing on the properties of the plants constituting the Solanaceæ, and, as a matter of course, said that the berries of the black nightshade(*Solanum nigrum*) were poisonous. A young fellow from Fort Dodge, Iowa, spoke up and said that the people in his neighborhood made them into pies, preserves, etc. and ate freely of them. I answered him, as became a professor of botany, by saying that as it was well known that black nightshade berries are poisonous, the student must have been mistaken. That was the young professor's way of settling things, and this particular thing remained settled for him for some years. After a while, however, I learned that the people in central and western Iowa *actually did* eat black nightshade berries, and they were not poisoned either. Later, I learned the same thing in Nebraska for this species, and still more for the spreading nightshade(*Solanum triflorum*), whose larger berries were freely used by the pioneers in the early days when other berries were scarce upon the Great Plains. [Prof. Bessey's communication adds another of the reputed poisonous species of nightshade to the edible list. It may also be news to some that the fruit of the egg-plant(*Solanum esculentum*) is really a nightshade berry and it may be inquired in passing whether any of the berry-like fruits of the nightshade family are poisonous when fully ripe. Among those that are not, may be mentioned tomato (*Lycopersicum*) red pepper(*Capsicum*) and ground cherry (*Physalis.*) The editor has eaten the berries of matrimony vine (*Lycium*) but cannot recommend them.]

HONEY-GUIDES CHANGING COLOR.—Another flower to be added to the list of those published recently in which there is a change of color in the honey-guides due to age, is the catalpa. This flower opens with the corolla streaked and dotted inside with purplish and in addition, along a groove in the lower petal which leads to the nectar, there is a series of yellow blotches ending at the entrance to the flower in two diverging streaks. These yellow markings soon turn to orange and later assumed a brick red or magenta hue, so that one can tell approximately how long the flower has been open by the color of these honey-guides.

EFFECT OF CLIMATE ON PLANTS.—Climate is doubtless the most important factor in modifying plants. Not only does it absolutely limit the range of species north and south, but in such species as are distributed through many degrees of latitude, it influences the form, color and fruitfulness. By comparing northern and southern plants of the same species we find that the cold tends to dwarf the plant but to increase the leaf surface. Northern plants are usually more fruitful than those from the south and the flowers are larger and deeper in color. Warm climates,on the other hand, tend to increase the production of essential oils, and alkaloids but nectar is most abundant and contains the most sugar in northern lands.

WHAT THE BEE DOES WITH POLLEN.—Many flowers that secrete no nectar are visited by bees who carry off the pollen. In *Country Life in America* Mrs. Anna Botsford Comstock tells us that the bee uses the pollen to form the bee bread used as the food of young bees.

SENSITIVE PISTILS.—Many flowers like the kalmia and barberry have sensitive stamens which spring up and dust visiting insects with pollen, but cases of flowers with sensitive pistils are less frequent. They occur, nevertheless, in several common flowers, among which may be mentioned the catalpa, trumpet-creeper (*Bignonia*) and monkey-flower (*Mimulus*). In these the stigma is bifid and spreads out until an insect comes in contact with one of the lobes when it at once closes. By touching such a stigma with a stamen from the flower, this closing may be observed in many cases.

DISAPPEARING STAMENS.—We are so accustomed to find at least one stamen for each petal of the flower that the blossoms of the mints and figworts containing fewer stamens seem curiously lacking in these organs. The novice is likely to wonder whether these plants have always been that way, and if not, how they lost their missing parts. Probably we shall never know exactly how it has been brought about, but the *why* of the subject seems best explained upon the supposition that having a most effective means of dusting insects with pollen by the use of two or four stamens the flowers can do without the others. It is likely that these unnecessary stamens gradually dwindled away and disappeared. We can see evidences of a fifth stamen in many of the figworts, notably in the beard-tongue (*Pentstemon*) where it forms a bearded organ larger than the fertile stamens. In other plants it forms a nectary. The blossoms of the catalpa exhibit an interesting series of stamens in various stages of development. In the normal blossom there are but two perfect stamens, but the other three are usually present, sometimes as mere threads at the base of the flower, at others larger and producing some pollen and in still others as large and as well developed as the two that are normally developed.

PELORIA.—*The Gardening World* recently figured a case of peloria, as it is called, in the common English foxglove (*Digitalis purpurea*) in which the terminal flower in the inflorescence, instead of being turned sidewise and irregular in shape was erect and regular, that is each petal was shaped exactly like the others. It is said that "monstrosities" of this kind can be bred up until most of the flowers in the spike present this peculiarity. The same journal notes that peloria is also common in the toad-flax (*Linaria vulgaris*), the snap-dragon (*Antirrhinum majus*) and the various species of *Pentstemon*. It may be added that all irregular flowers may be expected to produce these examples of peloria at times and when one comes under the notice of the student he can usually produce a race possessing the peculiarity by carefully breeding from his specimen.

AMERICAN CRESS.—There appears to be no accounting for the common names of plants upon a reasonable basis. The plant that, according to Gray, Americans have imported from Europe and cultivated under the names of early winter cress or scurvy grass (*Barbarea præcox*) is cultivated in that country under the name of American cress. According to the editor of *Gardening World* this plant is not native to the British Isles, but Gray denies it a resident in America, so that when found it appears to be an immigrant from some other region, possibly continental Europe. How it came by the name it bears in England is something of a mystery. *Gardening World* suggests that it may have been due to its introduction into cultivation from America. The common species of *Barbarea* (*B. vulgaris*) is supposed to be native to the northern parts of North America but to be introduced southward. At any rate the plant bears the ear-marks of an alien, growing nearly always not far from cultivated grounds and thriving in fields and along roadsides.

FROST-WEEDS.—The rambler during the cold mornings of late autumn or early winter may chance upon a curious phenomenon in the frost crystals that develop from the base of the stems in certain plants. The cause of these frost crystals seems as yet imperfectly understood, but the fact that they occur is so well known that certain species are known as frost weeds or frost plants from the frequency with which they exhibit them. The best known of the frost plants is the common rock-rose (*Helianthemum Canadense*) but the phenomenon is known to occur in many others, and is very common in the dittany (*Cunila Mariana*). One observer has written of it: "Our *Cunila* has attached to the stem a shell-work of ice of a pearly whiteness, beautifully striated, sometimes like a series of shells, one within another, at others curved round on either side of them like an open polished bivalve; then in others again curled over in every variety of form like the petals of a tulip." The crystals form when the temperature is above zero and appears to be due principally to capillarity and the contraction of the stem due to freezing.

THE MOVEMENT OF PLANTS,—One of the main distinctions between plants and animals made by the uneducated is that animals move about and plants do not. Such a rule, however, has about as many exceptions as it has cases that agree with it. It is true that the mature flowering plants cannot change their locations, but their children can as may be seen on any autumn day when multitudes of travelling seeds,—which are essentially cases containing small plantlets,—are to be found moving about in various ways. Among the lower plants, such as the algæ, many mature plants can move about, (good examples may be found among the diatoms and the *Oscillatorias*) while among the lower animals there are numerons instances of mature forms that are fixed to their locality, such as the oyster, sponge, coral polyp and barnacle. The higher plants, however, while they cannot move about, can move various parts and do so constantly. The sensitive plant is one of the best instances we have, but the sundew and Veuus fly-trap are not far behind. Other forms of motion in plants are recognized in the turning of roots in the soil, the turning of leaves to the light the reaction of stems to light, the coiling of tendrils and the so-called sleep movements of plants.

SECOND HAND VARNISH.—The resting buds of many trees and shrubs are covered with a resin or varnish that acts as an effectual barrier to the rain and snow of winter. This varnish does not lose its usefulness when the bud scales have served their purpose, but is gathered by bees for their own uses. *Country Life in America* says that bees have been seen gatheriug this varnish from the poplar, horse-chestnut, birch, willow, alder and the balsam fir.

THE MEDLAR.—The Medlar (*Mesphilus Germanica*) is an Old World fruit related to the apple and quince, well known by reputation at least from the fact that it is not edible until it begins to decay. The ripe fruits are hard and unpalatable but if allowed to lie for from two to four weeks they become soft and edible. The decaying process is called bletting, and is probably similar to that which causes the persimmon and banana to slowly turn from astringent hard fruits to soft sweet and edible ones. This is accomplished in the case of the banana and persimmon at least, by vegetable ferments which change the starches and tannins to sugar and it is quite likely that this is the case with the medlar also. Real decay, as we understand it, is caused by bacteria breaking up plant substances into simpler ones. It is probable that the Medlar does not need to actually decay to become edible.

Editorial.

The indexes for the first four volumes of this magazine have been published and may be had for the asking by any reader who owns these volumes. The "copy" for indexes to all the other volumes is now ready for the printer and we expect will soon be issued.

⁂

For some years the editor has been preparing a book on the fern allies and this was recently issued by the F. A. Stokes Company of New York. The fern allies comprise a curious company of plants that, with the ferns, constitute the Pteridophyta one of the four great groups into which the plant kingdom is divided by botanists. They stand midway between the mosses and the flowering plants; in fact bridge the gap between the two. Among them may be found the scouring rushes, the ground pines, the quill worts, the selaginellas, the pepper-worts and many others whose strange forms and unusual manner of fruiting make them attractive to the collector and plant lover. One of the chief reasons for putting this book together was the fact that there are no other books that treat of the subject in an untechnical way. The plants are mentioned in all works devoted to the Pteridophyta, but the beginner cannot always identify his plants from a brief technical description. A large number of these species, too, have never been previously illustrated, and some of those that have, were published in works not easily accessible to the novice. In the present volume all have been illustrated and described in untechnical language and there are additional helps to the identification of the species in the shape of seven keys. The life history of each species has been given so far as known. It is expected that the beginner will now be able to identify his plants with ease, but if the users of this book meet with any perplexities in the process, the editor will be glad to set matters right if specimens are sent to him.

Most readers are aware that a serious strike of the printers is threatened for the first of the year. Even the great magazines are preparing for delays in publication by notifying their readers that they may not appear on time after January. We do not anticipate any delay in the publication of this journal, but if it should not appear on its regular dates our readers will understand why, Twelve numbers will be issued in 1906 as usual.

BOOKS AND WRITERS.

The *Nature Study Review* announces that at the end of its first volume it will be changed to a monthly and issued for the nine months of the school year.

A series of twelve panels of California wild-flowers reproduced by color photography from the original paintings by Mrs. Elizabeth Hallowell Saunders, has recently appeared. The arrangement and coloring of the specimens reflect great credit upon the artist and appear to have lost little in the reproducing. Accompanying each plate is a short account of the plant illustrated which gives the most important facts about them.

The publishers of *Country Life in America* announce that next year the subscription price will be advanced to $4.00 a year. It is becoming patent all along the line that publishers of outdoor literature have been giving more than they can afford to for the price. After all, any magazine is worth just as much to each reader as he can get out of it. It cannot be judged by the quality of its paper or the number of its pages. The final test is how much is its worth to you. If you can get a dollar's worth out of a dollar magazine, that is the magazine for you to buy. if the value advances with an advance in price, everybody should be satisfied.

The editor of *The Apteryx* says that owing to the pressure of business, the delinquency of subscribers and the lack of co-operation by those in authority the magazine is practically defunct. Further issues will be in the form of separates. The editor was apparently discouraged too easily. A pressure of business and a list of delinquent subscribers are ever with the editor and add spice to his existence. As for co-operation, the editor must co-operate with himself, first, last, and all the time, winter and summer, day and night. Thus only, can the small publication keep in the procession. If anyone yearns for the strenuous life, let him start a scientific magazine.

California boasts that her trees are larger, taller and older than any others on this planet. In variety, also they are said not to be exceeded by those of any region of equal area. Taking the cone-bearers as an illustration, there are nearly fifty different species and the broad-leaved trees are as varied. Another curious feature is the absence of such well-known eastern trees as the magnolia, elm, basswood, beech, hickory, chestnut, persimmon and mulberry, while the oaks, maples, birches and others that occur, are different from those found on the opposite side of the "great divide". Years ago Dr. Albert Kellogg made a large number of drawings of the trees and shrubs with the idea of making a manual of the trees, but this was never completed. The work was destined not to be lost to science, however, for Miss. Alice Eastwood has given them fitting setting in her "Hand-book of the Trees of California" issued by the California Academy of Science. The book contains nearly a hundred pages of text in which the trees are carefully described and about sixty plates that well illustrate the subject in hand. There are three Keys to the species. In a series of footnotes, the trees of Washington, Oregon and Arizona are added so that the book is practically a hand-book to the trees of western America and as such will be welcomed by all students of the trees.

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VOL. 9. DECEMBER, 1905. NO. 6.

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Vol. IX. BINGHAMTON, N. Y., DECEMBER, 1905. No. 6.

OLD GARDEN FLOWERS AND THEIR NAMES.

BY GRACE GREYLOCK NILES.

THE fantastic forms of flowers, the strange shapes their leaves and roots assume, as well as the fragrance and healing virtues they possess had much to do with the common names given them by the ancients. In Greece and Rome nearly every god had a leaf, flower, bird or reptile sacred to his temple, and it was the custom of the early poets and natualists to honor these symbols with appropriate designations. Many flowers were dedicated to gods, goddesses and nymphs, while kings, queens, physicians and philosophers were honored in later days. The lark's-claw, dragonwort, paeonia, hyacinth, and Our Lady's slippers are among the common names suggestive of their origins. In order to grasp the meaning of the Greek and Latin derivations it is necessary to remember that they are but the explanations of there first common names.

Pliny, the greatest naturalist in Christ's day, wrote that our garden Pænias were among the most ancient flowers known, and were named in remembrance of that good old man Paeon,—a physician of Paeonia in Macedonia. He was the discoverer and recorder of these blossoms and used their seed as a remedy for nightmare and melancholy dreams. Undoubtedly pre-historic people had means of distinguishing the flowers and fruits upon which they subsisted. The knowledge of savages and also wild animals has been proven to be keen and accurate in regard to the values and medicinal virtues of plants.

What a wealth of fragrance falls to the earth in May in the shower of rosy petals when the orchards, the briar-rose and hawthorn blossoms drift down to the roadside hedges. The rose figured in early classical ornamentation, curtains and vestments were wrought with rich embroidery and placed upon the statues of the gods or hung about the altars. To-day in the temple of Vesta at Trivoli may be seen a freize ornamented with bull heads, and garlands and festoons of roses. The heads of the animals offered in sacrifice were crowned with the flower sacred to whom the offering was made.

How appropriate are flowers as memorials to our dead. Each year they renew their bloom and scatter seeds for generations unknown. Indeed, the name *Artemisia*, given by King Mausolus to the flowers bearing his Queen's name shall outlast the Mausoleum of Cairo—one of the seven wonders of the world erected to Mausolus' memory by the Queen.

The *Artemisias* and *Chrysanthemums* are among the most ancient of names in the history of plants. *Artemisia*, known also as wormwood, is an emigrant from Europe, and often grows along our roadside lanes, it having wandered thence from old garden enclosures. The ancient name ot wormwood was *Absynthium*, orignating from this plant's bitterness; and it is known to-day as *Artemisia absynthium*. These plants are closely allied to our popular chrysanthemums, originally known as mugworts. Such bitter or aromatic plants were used to preserve the flavor ot beer and other beverages, and many spicy leaves are still employed as mugworts. Pliny mentions the *Artemisia* especially among the mugworts of the ancients, and states that it was named in honor of the Queen of Mausolus, King of Cairo. Before the King's day they were known as *Parthenis*—virginal. Others held that they were named in honor of Diana, whose ancient name was Artemis, the superior goddess ruling over suffering womanhood, and for this reason the white poppy from which opium is derived was sacred in her temple. Our American *Sol Indianus*, the "Golden-flower-of-Perrow," found in the West Indies, was the original title of the chrysanthemums, and comes from *Sol* the ancient name of

Apollo—the god dispensing rays of light. *Sol* signified the sun, and was applied to these sun-flowers which were held sacred in the sun-worship of the Indians.

The common name of chrysanthemum is of Greek origin and signifies "golden flower." These flowers were known to Dioscorides in the time of Christ and could the merry kings of Cairo and poets ot Ionia behold the size of our chrysanthemuns, the flower show of to-day would seem a greater contest than ever did the games of Olympus ot the ancient Greeks. The plants of this composite family are bitter as wormwood and of a disagreeable odor.

It is pleasant to follow such pungent flowers with the story of the fragrant roses and violets. The very name *Rosa*, calls forth memories of the old gardens of our childhood! It is associated with the finer emotions of all nations, and is the flower of Cupid. The Greeks called the roses *Rhodon* because of their fragrance, and Plutarch wrote that they were originally all white, until Venus, while wandering through the fields of roses, wounded her sandaled teet on the thorns and sprinkled their snowy petals with her blood, thus changing some of these flowers to crimson, Philostratus, however, claims that the rose is the flower of Cupid, and that while the mischievous god sat near his mother at a banquet, he became joyous with wine, and overthrew the heavenly nectar, sprinkling the white roses adorning the table and there were ever afterwards pink or wine colored roses.

Violets and hearts-ease were known to the Greeks as *Ion* in memory of that beautiful damsel Io loved of Jupiter who transformed her into a gentle heifer feeding upon the violets about Ionian fields. The Romans knew them as *Violae*. Pansies or heart's ease are somewhat similiar to violets and as early as 1578 are reported growing among the corn stubbles in England where they were know as "love-in-idleness."

The hyacinth was anciently known as white until Ovid's red lily, *Lilium rusum*, of which he wrote that

Apollo by misfortune in contest slew the boy, Hyacinthus sprinkling the blood of the child over the grasses on the field. Apollo in his grief commanded that the earth should bring forth a flower like a lily, save that it should be crimson, in memory of the beautiful youth Hyacinthus. The narcissus flowers derived their name from that noble youth Narcissus. who was admired by many fair ladies. Being shy and modest he desired to free himself from their adoration and sought the solitude of the forests, diverting himself by hunting wild beasts. Upon becoming thirsty he sought a fountain from which he would have drunk but when he beheld his own countenance mirrored in its clear waters, he believed the reflections to be that of one of the beautiful nymphs from whose advances he had fled. Never before having beheld his own reflection, he became enrapt with the love and admiration of his own beauty and desired to embrace his image. And when he found this to be impossible he died at last, from love of his own shadow. In his memory the poets of Ionia prevailed upon the earth to bring forth these delectable and fragrant flowers.

Like the Dutch tulips and American chrysanthemums, the orchids are popular in cultivation to-day. They were familiar to Pliny in the time of Christ, under the names of *Orchis*, *Serapias* and *Satyrion*. In the fifteenth century in Europe there were about twenty-six species known; later in 1753 Linnæus described sixty-seven varieties and to-day from six to ten thousand species are known and reported for the world. The *Cypripediums*, commonly known as Lady's slippers and moccasin-flowers, were first mentioned in 1616 by Rembert Dodoens, the physician to the Dutch Emperor, under the title of *Calceolus Marianus*. The Latin *Calceolus* signifies "round like a little shoe" while *Marianus* suggests "Our Lady the Virgin Mary" in honor of the Mother of Christ. In 1740-1753 Linnæus, the master botanist, revised the names and classification of all plants and rededicated this genus as *Calcelous* to Venus in honor of her ancient name *Cypris*, "Our Lady the Mother of the Romans." Thus to-day we have the name *Cypripedium*, still wearing the original common name, Lady's slippers or Venus' slippers. These names are of European origin, although the Algonquin Indians of Northeastern America saw the same shoe-shaped resemblance in these flowers and called them mawcahsun or makkasin-flowers.

The name *Orchis*, as applied to the orchid family had its origin in heathen mythology. *Orchis*, the son of a rural god, Patellanus, and the nymph Acolasia,—attended the festival of Bacchus, and offended one of the priestesses with his behavior. He was reported to one of the attendants, and they in anger tore him to pieces. The pathetic pleadings of his parents with the co-deities, influenced the superior gods to command flowers to arise from the bog-lands of the world in perpetual memory of their beautiful though unruly son. These strange untamable flowers still bear his name, and are a lasting symbol of his beauty.

The highest types of flowers suggestive of purity and immortality, are the lilies and like the roses they were originally white. They are bell-shaped with "a little clapper within, and have six little threads, each bearing a pointed note for title." These parts were not understood by the ancients as they are to-day. In most of our Easter lilies the anthers covered with pollen-dust are removed before the shipment of the flowers to distant lands. By this means the lasting powers of the flowers during the season of sale are enhanced.

The Grecian name for lily was *Rosa Junonis* in memory of Juno, the protector of marriage. Later the Romans knew them as white lilies (*Lilium album*). Emperor Constantine records a beautiful legend of these flowers. When Jupiter and the nymph Alcmena wished to make their son Hercules immortal, the child was carried to the breast of Juno, Jupiter's wife, while she slept in heaven. And when it was perceived that the child had been dowered with immortality and was possessed of extraordinary strength he was withdrawn from Juno's breast.

However the source of strength and immortality continued to flow and the greater part was spilt in heaven, and fell upon the starry skies. In the white and milky way the scars remain even to this day and may be observed arching from North to South as *Via Lactea* or milky way. Some fell in scattered showers upon the distant earth and gave birth to the pure white lilies of Immortality—the sacred Easter flowers, glorifying the altars of our temples twenty centuries after Christ.

New York City.

A NEW CONNECTICUT BLACKBERRY.

BY W. H. BLANCHARD.

RUBUS FLORICOMUS n. sp. Erect, sturdy plants abundantly pubescent with occasional stalked glands on the nearly leafless racemes. Leaves on both canes similar, slender. Very showy when in flower.

NEW CANES. Stems erect or slightly recurving, 3 to 5 feet high, stout, glabrous, green, branched on strong canes, deeply furrowed, 5-angled. Prickles on the angles only, straight, strong, set at a right angle to the stem, 5 to the inch, 3 to 5 sixteenths of an inch long. Leaves of moderate size, 8 in. long and 7 in. wide, 5-foliate, yellow-green and quite hairy above, lighter below and velvety to the touch with abundant pubescence. Leaflets narrowly oval, outline entire finely mostly singly serrate or somewhat serrate-dentate, short taper-pointed, the middle one rounded at the base, the others wedge-shaped, rather thick and firm, about one-half as wide as long, the middle one wider, all stalked. Petiole and petiolules slender, terete or slightly grooved, glandless, somewhat pubescent, prickles rather stout and hooked, not numerous, in three rows continued in one on the midrib; the petiolule of the middle leaflet over an inch long, those of the side ones one-half as long, the basal ones short-stalked.

Old canes. Stems still erect, not bent by snow and weight of foliage, prickles intact, darkened slightly in color or brown. Second year's growth consisting of short racemes at the top of the cane increasing in length downward and succeeded by short leaf branches increasing in length downward also, one from each old leaf axil. Leaf branches resembling the new canes, stems angled on one side, slightly pubescent, glandless, prickles strong and straight, slanting slightly backward. Leaves largely 5-foliate, some 3-foliate; in pubescence, serration and shape very much like the leaves on the new canes. Racemes on a straight axis, 3 to 6 inches long 8 to 12-flowered, pedicels slender, ¾ inches long, set at a great angle with the axis, the outer subtended by small bracts, the inner by small trifoliate and unifoliate leaves; prickles not abundant, slender, strong, straight, backward slant slight; pubescence general, short, fine, copious, with occasional stoutly stalked glands intermixed. Flowers remarkably showy 1¼ inches broad, blade of petals nearly as wide as long. Fruit globes, small, rarely one-half inch in diameter; drupelets large, black; sepals reflexed. Flowers the middle of June, fruit ripe the middle of August.

Found only on dry ground in open sun or light shade. Type station in the road and the adjoining pasture on the east side of Savage St. near its junction with East St. in the southeastern part of Southington, Conn. Abundant in that part of Southington and in the part of Meriden adjoining.

My first knowledge of this plant was obtained in August, 1903, when I found it in the section mentioned. It is abundant there growing in pastures by the acre and along the roads over a considerable section partly surrounding the West Peak of the trap dyke known as Meridian mountain, and on the mountain as well. Afterwards I learned that Mr. C. H. Bissell, the well-known local botanist had collected it a year or two before at Newell's Rock in the section named. In July, 1904, and again in June and August, 1905, I studied and collected it.

It resembles *R. nigrobaccus*, Bailey, in size, color of foliage, pubescence and in its leafy branches below and nearly naked racemes above. But it has narrow leaflets and wide petals, is practically glandless, and has a small round fruit with large drupelets, in all of which it is just the opposite of that well-known species.

Westminester, Vt.

FRINGED GENTIAN NOTES.

A FEW new facts have been learned the past season concerning the habits of the fringed gentain, which perhaps may be of some interest to AMERICAN BOTANIST readers.

It has been found that the seeds of a given sowing do not all germinate the first season. Thus, a considerable number which were expected to have grown in the Spring of 1904, from the planting of previous Autumn, did not appear until this spring (1905). They were then noticed coming up beside the plants that had already made a season's growth. There seemed to be no interference with one another between the two sets, so that by Autumn, flowering plants and those of a season's growth were found growing side by side from the same sowing. Such a peculiarity if constant in the seeds would serve a colony well in providing a succesion of plants until the third year after a seed crop. This may mean a saving of a colony from extermination, should some mishap befall the crop of seeds, an occurance which quite likely may occasionally happen.

The depauperate plants so often noticed in the field, may be produced by the thousand, if one will simply allow the seedlings to remain crowded in the seed bed. The writer had them of all descriptions the last summer. Few of them were able to reach a height of six inches, or produce more than one or two blossoms. It is remarkable how persistently each would blossom under unfavorable conditions. One depauperate in particular was so diminutive as to hardly pass for a gentian at first sight, the leaves being little more than bracts, and the blossom correspondingly small.

It was interesting to note the tendency to "sport" as the gardeners term characteristic in plants where new forms appear. In a group of twenty five potted plants, all showing an equal amount of moisture, shade, room, and fertility of soil, three destinct colors of the corollas were noticable. In the greater number of plants the blossoms remained the same color as that commonly found in the wild flowers. Then a few were intensely deep blue, more so than any I have ever noticed in the field. In another, the corollas were rather light and inclined to be striped with bands of white. It is quite likely, that by careful seed selection a race of flowering plants would result from this last variant. Perhaps such an addition to our ever increasing list of new "creations" would be more welcomed from a gardening stand point, than to appeal attractively to many lovers of wild plant life.

As considerable interest has lately been awakened by the attempts at cultivating the plant, a few hints may be acceptable to those who would add it to the wild flower garden. These if adhered to may safeguard against possible disappointment, unless indeed, local conditions differ greatly from those of this vicinity. It is well to remember however, that the fringed gentian is not the easiest plant to make grow, This statement applies particularly to those who do not find nearby plants growing in a wild state.

The writer has been most successful with seed planted during November, and December. Flats or boxes filled with soil rich in humus, have been found to make excellent seed beds. Each flat is permanently placed in a shallow tray sufficiciently tight to prevent the rapid escape of water, with which the tray is filled occasionally. By this means the soil in the flats is kept constantly moist. The seeds are sown on mere marks made in the soil with a small stick, and lightly covered with sifted sand. A litter of leaves, held in place with sticks or pebbles is placed on the seed bed until Spring, as a protection from heavy winter rains, which otherwise would wash out the very small and light seeds. The young plants must be kept in partial shade. They may be allowed to remain undisturbed until Autumn, or the following Spring, when they should be transplanted while yet dormant. They will grow as luxuriantly in boxes or pots as in the open ground provided abundant moisture and shade are not overlooked. The direct glare of a mid day sun is injurious, while the ideal situation is where the slanting rays of the morning and afternoon sift through rather dense shade.

Like everything else the fringed gentian has its enemies by far the worst of these in this locality is a fungus disease. This apparently attacks the plants in all stages of growth from the young seeding to the plant in full bloom. The first indication that any thing is wrong will be that the plant is inclined to wilt at midday. In a few days or, sometimes not for several weeks the wilting becomes more pronounced and sooner or later the plant suddenly withers and dies. An examination of the lower stem and the tap root will reveal a blackened area usually encircling the root. Below this diseased portion the root remains perfectly normal for a considerable time after the death of the plant, above ground.

I am informed by Prof. A. F. Woods of the Department of Agriculture to whom affected specimens were submitted that the mischief is caused by a *Fusarium*. "This fungus," Mr. Woods further states, "while it appears never to have been reported upon gentians, is the cause of serious disease to many plants. There is no treatment practical for diseased plants; they must be removed and destroyed by burning, and as the fungus is capable of living in the soil and starting up new infections during succeeding seasons I suggest that you make a liberal application of quicklime to the infected soil. When a similar disease appears in plants in a greenhouse we recommend the entire removal of the soil."

It will be well therefore in making the seed bed to thoroughly sterilize by heat all soil in which the seedlings are to remain the first season. In transplanting the seedlings avoid soil or situations likely to be infected. This is rather vague and not reassuring advice to the prospective gentian grower. However, it is quite possible that the disease is less frequent in localities where the gentian is found growing wild, so that these suggestions apply more directly to those sections where the plant is rare, or wanting. As the fungus is a greenhouse pest it may be well to avoid setting out seedlings in soil devoted to cultivated plants.

The plant is also subject to somewhat serious insect attack. The most persistant, and mischiveous of these are certain aphids, which gather about the tap root, and rob the plant of its juices. The depredations of these pests may be averted or checked by the cautious application ot unleached wood ashes about the plants. A mild solution of kerosene emulsion may be depended upon to kill the aphids and also the plants unless skillfully handled. Quite frequently, the plants which have suffered from aphid attacks, fall victims to the *Fusarium*. Other insects destroy the seeds as they are germinating, and also cut oft the tenders cotyledons, after the seedlings have made a start. A species of ant also occasionally carries off the swollen seeds from the seed bed before germination has taken place.

These statements in regard to the plant's enemies are given, not with a view to discouraging the cultivation of the gentian, but rather they are offered as a partial explanation for the frequent failures attending the efforts of those who have endeavored to grow the plant.

Aiken, Md.

A WORD FOR MOSSES.

BY DR. WM. WHITMAN BAILEY.

AFTER all the wild flowers have gone; when we can no longer, after diligent search, find even the spider-like yellow blossom of witch-hazel in the woods, or "butter and eggs" in the meadows, we turn for consolation to the mosses. These, like the poor, we have always with us.

The more one examines them the more fascinating become these delicate creatures. To study them properly one needs both a dissecting and a compound microscope, the first for the gross examination of preparations, which are afterwards removed to the more powerful instrument. The beginner, without directions, is so apt to begin wrong end to. High-power lenses are for very small objects; for general study the low-powers are much the more useful. Moreover, it takes skill and instruction to use the compound microscope to advantage. How many persons have I set right who were using right instruments wrongly, and thus wasting precious time.

The parts of mosses upon which we depend for identification are extremely small. Everyone will recall the pedicels, bearing capsules or urns at their summits. These in a general way only, may be called the female flowers, though flowers as we know them, mosses have not. We can, in the same restricted way, call them the fruit, though they are but slight analogous even to that. Reproductive organs it is perfectly correct to call them. This is not the place to enter upon the modern view or interpretation of the reproductive process in mosses; it presupposes other knowledge. I confine myself here simply to what one sees. A capsule, *theca*, or urn, then has generally a ring about its mouth, called the *annulus*, upon which a series of teeth, always a multiple of 4, is supported. These processes are collectively called *peristone*, and may or may not be accompained by additional *cilia* and *ciliotae*. The whole opening is generally covered by a lid, which assumes many beautiful forms, and is known as the *operculum*. This, in its turn, has a hood-like or mitre-like cap which is usually deciduous, and is called the *calyptra*. The so-called fruit may be borne on the axis, either terminally or laterally, and upon this fact hinges the classification of mosses. It is not always easy at first to determine this. When the fruit is terminal the main stem may be continued by so-called "innovations"—axillary shoots arising below but over-topping the stem by vertical growth. We have often been perplexed by these. Indeed, anyone who takes up the study of mosses must be prepared for hard work; every step in advance, however, is delightful, so exquisite are the objects examined.

Why should these almost invisible parts be so marvelously fashioned? The little scales on a butter-fly's wing are more gorgeous in pattern and color than any Japanese fan. The ornamentation of a diatom more intricate than any design of man. The lines on the last are so minute as to require the highest power of our best microscopes to resolve. Why this exquisite finish? We find it throughout nature. Sometimes it would seem as if nothing were devoid of beauty—as if, indeed, beauty was the key note to the whole great mystery.

Besides the fruit of mosses so diverse, the leaves are charming; they are extremely varied in outline and margin now broad and pellucid; again narrow, curve pointed, serrate and of finer texture. The colors, too, are far from uniform; moreover, the pattern of the veining (*areolation*) is distinctive, at least of genera. Like ferns, mosses lead their votaries to most entrancing localities. The very odor of a moss, an odor which it seems always to exhale when moistened, will carry one in imagination to shaded rills, to dashing cascades and to high alpine summits, riven and split by the wild contests of time and storm. At any season there are some mosses in condition to study, hence they offer numerous attractions to the botanist.

Our country has produced some very distinguished students of mosses, among these Dr. W. L. Sullivant occupied a prominent place. Then there are the great names of those only lately among us—Tuckerman, James, Austin, Lesqueraux. Among our living students of merit are Prof. C. R. Barnes of Chicago, Mrs. Elizabeth G. Britton of New York, Prof. J. Franklin Collins of Brown University and Dr. Kennedy of Milton Mass. The man or woman who knows mosses may be relied upon to possess a vast deal of other useful botanical knowledge.

Brown University, Providence, R. I.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical items. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

SEED DISTRIBUTION IN WILD CUCUMBER.—In a large number of species in the gourd family, the seeds are released at maturity by the decay of the fruit containing them, but the wild cucumber (*Echinocystis lobata*) has devised a more expeditious way. The fruits hang downward from the vines and when ripe the lower end opens displaying two tubes through which the seeds are discharged. To facilitate this operation the seeds are surrounded by considerable mucilage which causes them to slip out readily. The fruits do not at once decay, and usually hang on the vines during the winter. The structure of this fruit is most interesting. By dissecting off the outer covering the frame-work of the tubes is seen to be composed of interlacing fibres which may be removed entire and resembles in shaps a diminutive pair of trousers. Long before the embryo seeds have begun to grow, provision has thus been made for their dispersal.

BAY-BERRY WAX.—The bay berry or wax myrtle (*Myrica cerifera*) is familiar to all frequenters of the sandy wastes bordering the Atlantic in the North-eastern States, but few are aware that the wax-covered berries are of commercial importance. According to *St. Nicholas*, however, the quantity of bay-berry wax or bay-berry tallow produced from this source is in favorable years about thirty thousand pounds. One individual is reported to have made seven tons in one year, by no means a small undertaking when it is known that a bushel of berries yields only from five to seven pounds of wax. As may be supposed from the size and location of the berries, they are not picked one by one but are rubbed from the bushes into a pan suspended from the neck of the picker. The wax is removed by throwing the berries into hot water. It is clear hard wax with a greenish tint and when made into candles gives out a fragrance that savors of the crushed bay-berry leaves. Dealers call the wax, myrtle wax.

ORIGIN OF THE NAME, MEADOWSWEET.—If we are to believe the investigators into the history of plants, the name of meadowsweet, applied to certain species of *Spiraea* has no connection with meadows. An English plant with fragrant leaves was once used to flavor a drink called mead and hence was literally the mead-sweetener or meadowsweet.

PLANTS AND TEMPERATURE.—In regions where buckwheat is grown the seeds are usually planted late in the year and the crop gathered just before frost. Not infrequently the frost may catch some fields before the crops are fully ripe and the way in which it appears to select the fields seems past the comprehension of the ordinary individual. Down in the valley where one would think it should be warmest the plants are often killed, while fields on the hillsides escape unharmed. There is a reason for this, however. It has been found that the cold air is likely to settle down in the valley, while the warm air that filled it by day rises along the hillsides and keeps the frost away from the vegetation there. These facts have an important bearing on the distribution of plants and it has been shown that the northernmost representatives of southern species are likely to be found on hillsides while northern plants extending southward are likeliest to be found in valleys. This is just the reverse of what one would naturally expect and seems due to the inversions of temperature with which the growers of buckwheat are familiar.

Acid from Wood Sorrel.—In the old world it is said that large quantities of the wood sorrel (*Rumex Acetosella*) are used for the extraction of oxalic acid. This acid is a deadly poison but does not occur in the plant in quantity sufficient to be harmful. The same acid is found in the succulent rhubarb (*Rheum Rhaponticum.*)

Changes In Plant Names.—Let us take a few of the commonest examples of this juggling with names of plants. We all know the genus *Inga*. This was a name given by Plumier to the genus, and adopted by Marcgraff. It is the South American name of *Inga vera*. The synonyms of this genus have varied between *Acacia*, *Mimosa* and *Inga*, and even *Calliandra*. The genus is now called *Pithecolobium*. Old time gardeners knew the bottle brush plant as *Inga hœmatoxylon*. The Manila Tamarind they knew as *Inga dulcis*. The name was simple, and had nothing against it. Paxton, Lindley and other contemporary botanists were satisfied with *Inga*. There comes along another botanist who thinks the genus ought to be called after its native name, monkey's earring, and straightway he coins *Pithecolobium*, from *Pithocos*, an ape, and *lobos*, the lobe of the ear. Now it is clear that the natives of South America knew the plant as *Inga*, therefore it cannot have been known to the South Amercan native as monkey's earring. It would therefore have been well to have let the old name stand. Take another common name. When Linnæus bestowed the name *Cypripedium* upon the genus of orchids which we all know so well, he intended that it should mean Venus' slipper (from *Cypris*, one of Venus names, and *podion*, a slipper). It was a pretty and very appropiate name. The modern systematic botanist comes along and changes this pretty and wȩll known name to *Paphiopedilum*. We regard this as a senseless change and shall continue to use the old name. We could go on multiplying instances *ad nauseam* but the two we have quoted will suffice to convey our meaning.—*Indian Planting.*

Poisonous Roots.—A great many people hesitate to handle plants with which they are not familiar for fear of being poisoned. There is a general impression that a large number of wild plants are poisonous to the touch, but as a matter of fact, not half a dozen in any one locality are really so. The number of plants that are poisonous when eaten is much larger. Several of these have poisonous roots as well, and some with poisouous roots have harmless or edible fruit. Among common plants with poisonous roots may be mentioned May-apple (*Podophyllum*), Bloodroot (*Sanguinaria*), Poke (*Phytolacca*), Elder (*Sambucus*), India Hemp (*Apocynum*), Hellebore (*Veratrum*), Lily-of-the-Valley (*Convallaria*), Bane-Berry (*Actaea*), Bug-bane (*Cimicifuga*), Aconite (*Aconitum*) and various species of *Iris*, *Solanum*, *Trillium*, *Euphorbia*, *Cicuta* and *Ipomea*.

The Arum and Insects.—A British species of *Arum* (*A. maculatum*), closely related to our own Jack-in-the-Pulpit, produces a ring of hairs on the spadix above the stamens and pistils and about this ring a most interesting story has been made to the effect that it acts as a trap for pollinating insects. It is said that the stiff hairs pointing downward allow the insects to enter the spathe, but prevent their exit. The small prisoners are fed on honey until the anthers discharge their pollen. Then the hairs shrivel allowing the pollen-covered insects to depart to another flower, in this manner effecting pollination. Now comes an inconoclast with the statement that the hairs do not prevent the exit of insects, that the honey produced actually stupefies all that taste it, and that the plant is actually carnivorous and digests the insects that die in its spathes. Thus is another wonderful story relegated to the limbo of fairy tales.

Editorial.

During the past few months new subscriptions to this magazine have been coming it at a rate that has not been equalled in some time. Those who prophesied that the interest in nature only extended to learning the names of plants were decidedly mistaken. Our efforts to provide interesting and accurate information about the plants is being more and more appreciated and if the present boom continues we shall soon add more pages to the magazine. With the removal of the office of publication to Joliet, Ill., where the work of making the magazine can proceed under the direct supervision of the editor, we expect not only to be able to appear on time, but to add to the magazine much of value that cannot be given when edited at long range. The business office will remain as formerly in Binghamton, but subscriptions may be sent to either office. This will enable western subscribers to get replies to their letters much earlier than heretofore.

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If any numbers are missing from your files of volumes 7, 8 and 9 of the magazine, we shall be glad to replace them free if notified at once. This offer no longer extends to the earlier volumes, some of which are fast approaching the time when they will be out of print. If you do not possess a full set of these early numbers, better get them before the rise in price. We believe that we do not exaggerate when we state that at least a third of those whose names appear in the botanical magazines, have full files of this publication. The back numbers form an encyclopedia of botanical facts that cannot be duplicated for the price anywhere.

⁂

The editor of *Indian Planting and Gardening*, commenting on the New Jersey tea article in a recent number of this magazine, assures his readers that we referred the plant (*Ceanothus Americanus*) to the Sapindaceæ or soapwort family. If the editor will look at the article again he will find that our statement was that it is *allied* to the family mentioned. It is, as the editor states, a member of the Rhamnaceæ and thus closely related to the soapworts. Our reputation for accuracy is such that we do not like to have the people on the other side of the world get a wrong impression. The soapworts, represented in North America by a small group of buckeyes, horse-chestnuts and the soapberry, are more abundant in India having a large number of representatives. One of the best known of these is *Nephelium lichi* which yields the fruit known in this country as Chinese nuts or lichees.

BOOKS AND WRITERS.

"Ferns and How to Grow Them" is the title of a small volume by G. A. Woolson recently issued by Doubleday, Page & Co.

MacMillan and Company have recently published a second revised edition of Campbell's "Structure and Development of the Mosses and Ferns." The work is regarded as a standard by botanists and has been out of print for several years.

One can fairly judge of the length of time a country has been settled, by the character of the books relating to its botany. In new countries the botanical literature runs to the description of new species and the making of manuals but in countries that have been settled for a longer period, the plant student has had time to look about him and take note of something else besides specific and generic characters. In the end this is likely to prove the true botany, and it is an encouraging sign of the times that books of this order are beginning to appear. The best of these that we have yet seen is by Lord Avebury (John Lubbock) a scientist whose long familiarity with nature in general has especially fitted for the task. The volume is entitled "Notes on the Life History of British Plants" and follows the arrangement of the ordinary British botanical manual, but the material it contains is far different in character. It might be described as the matter that sometimes follows in small type the scientific description of the species, or is placed at the bottom of a page as a foot note or perhaps relegated to the limbo of an Appendix. It is, however, the information most in demand by the general plant student, and from it one may learn what insects visit the flowers, when the flowers open, the methods of pollination, and numerous other curious facts about them. The volume simply bristles with information about plants for which we search other books in vain, and although the species treated are British species, they are so nearly allied to our own that the book is almost as valuable for use on this side of the Atlantic as on the other. Indeed, many of the species mentioned are those that have become naturalized in our own country and so give the book an added claim upon our attention. There are more than 350 illustrations and 450 pages of text. (New York, The MacMillan Co. 1905. Price $5.00).

VALUE OF NECTAR.—Our entire supply of sugar, of course, comes from the vegetable kingdom, but we are likely to lose sight of the fact that up to the seventeenth century the only sweet in common use was derived from nectar. According to *Country Life in America* the United States now annually produces more than one hundred and twenty-five million pounds of honey. When we reflect that these millions of pounds of sweets have been gathered by bees from the nectar of flowers the immense value of nectar is apparent. Honey is held to be the most wholesome and digestible of all the forms of sugar.

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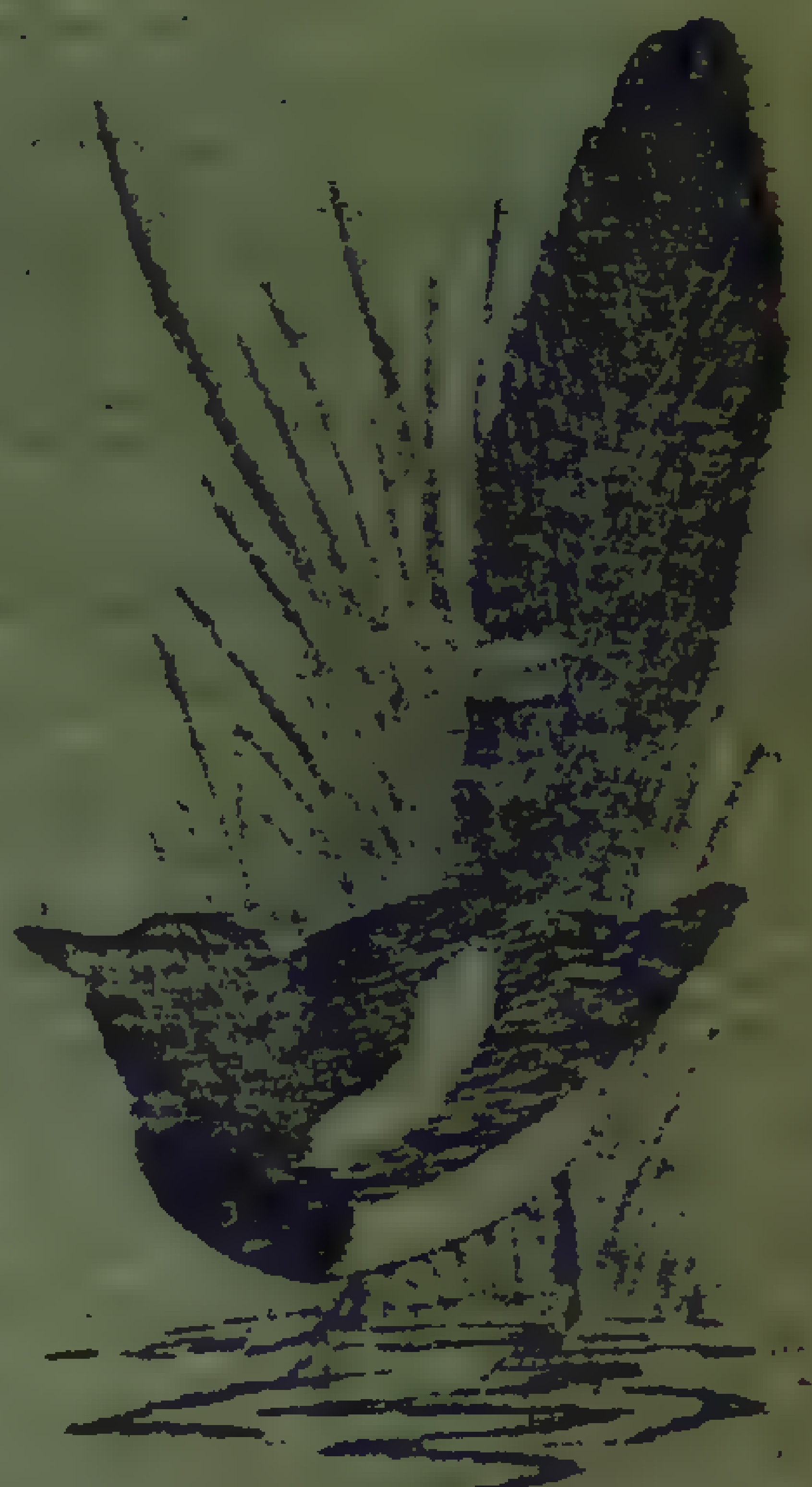

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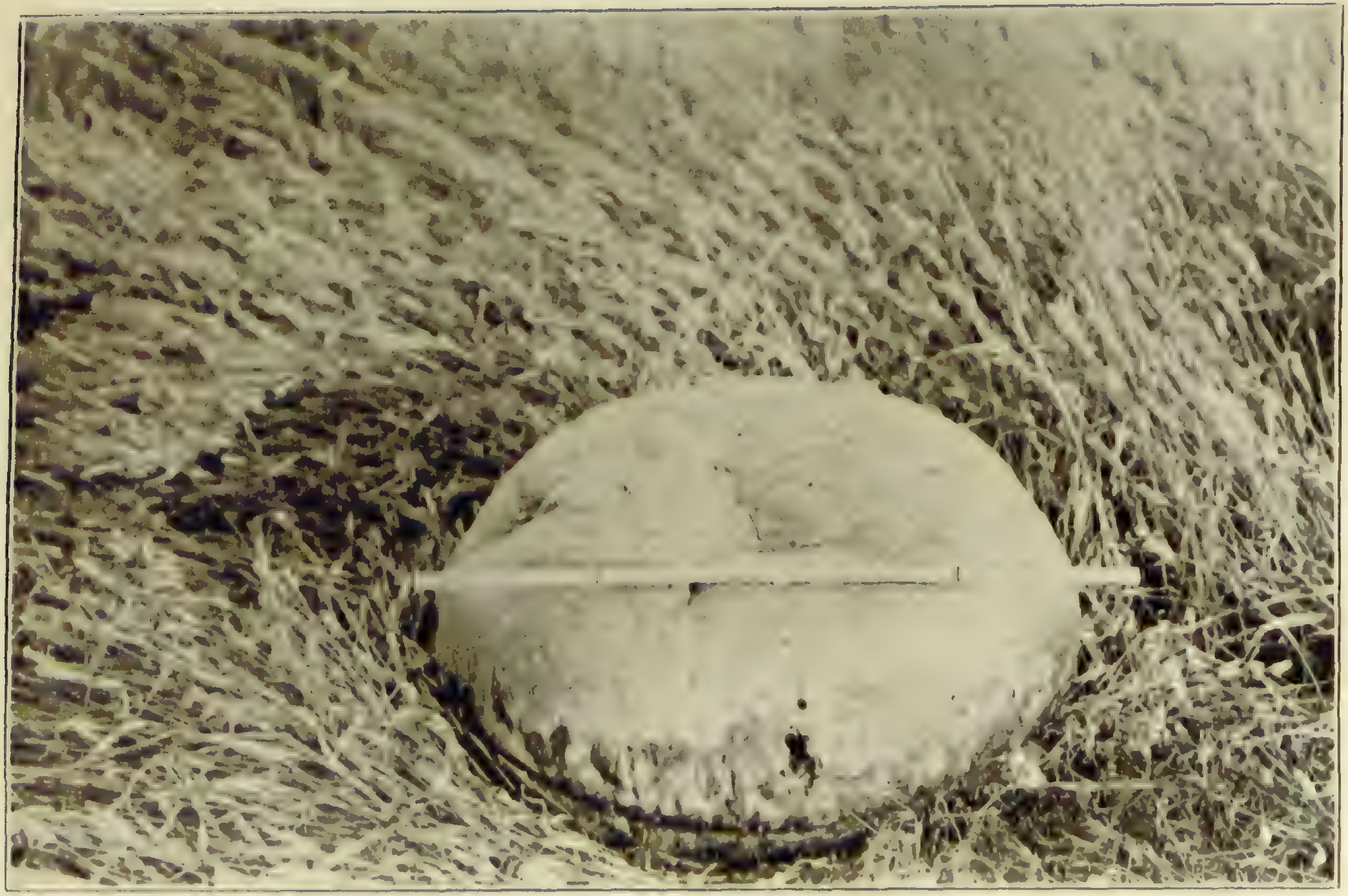

THE GIANT PUFFBALL.

THE AMERICAN BOTANIST

VOL. X. JOLIET, ILL., JANUARY, 1906. No. 1

THE GIANT PUFFBALL.

(*Calvatia Gigantea.*)

IN late autumn and early spring, when other objects of interest are scarce, the papery globes of various species of puffball are likely to attract the rambler's attention. Although often half hidden beneath the withered leaves, they do not long remain concealed, for the slightest touch is sufficient to cause them to send up a smoky cloud that makes their whereabouts known at once. Taken in hand, each specimen appears to be a more or less globular rind enclosing a brownish or purplish woolly mass that gives forth fresh clouds of smoke each time it is squeezed. Well might the superstitious and unbotanical countryman of the olden time call them devil's snuff boxes. In the present day, when a belief in the supernatural connections of plants no longer obtains, the objects are usually called smoke-balls or puffballs.

Although the mature puffball is a familiar sight to most frequenters of the country, there is an element of mystery surrounding its origin that many fail to fathom. The growing plant is so very unlike the ripe specimen that only the initiated are likely to discover the connection between them.

If we investigate the beginnings of the puffball we shall find that it is very much like that of the mushroom or any of the other conspicuous fungi. The greater part of the plant body is below the surface of the soil and consists of white, thread-like strands that ramify about in search of food.

Unlike the common plants, the puffballs have no chlorophyl or plant-green, and in consequence they are unable to manufacture their own food. They are, therefore, obliged to live on food elaborated by other plants, and a decaying root or moldering log is quite to their taste. In such a medium the fungus strands luxuriate until the plant is ready to produce its spores. Then little whitish buttons or globes filled with closely packed cells begin to appear here and there on the threads and, finally, after a good soaking rain, the tiny cells quickly absorb the moisture and the young puffball expands and appears above the surface of the earth. It is still immature, however, and if broken open has the appearance of an unbaked loaf of bread, the interior being filled with a pure white, cheesy mass instead of the yellowish-brown spores. As the days pass the interior slowly changes in color, first to yellow and then to brown. Ultimately the outer skin breaks open and the multitudes of spores are ripe and ready to fly out in a smoke-like cloud at the slightest touch.

Botanists call the outer rind of the puffball the *peridium* and the cheesy mass within, the *gleba*. At maturity the gleba usually turns to a woolly mass in which the spores are entangled. Under a microscope this is seen to consist of fine elastic hairs, to which the name of *capillitium* has been given. The fungus threads that answer to the plant body form the *mycelium*.

There are about fifty species of puffballs in the United States, and any locality is likely to contain several different kinds. By far the largest of these is the giant puffball shown in our illustration. Ordinarily it is from eight to fifteen inches in diameter, but some truly gigantic specimens have been recorded. McIlvaine mentions one from the Eastern States that measured three feet in diameter and weighed forty-seven pounds. Specimens four feet in diameter are reported from Europe. Its specific name of *gigantea* is, therefore, well deserved; in fact, this is probably the very largest fungus of any kind in the whole world. The specimen from which our plate was made was found in the Forest of Arden by Mr. H. C. Skeels and photographed by Prof. V. D. Hawkins. In the fresh state it measured twenty-three inches in diameter. At present it is deposited in the museum of the Joliet Township High School and is regarded as the largest museum specimen of this fungus in existence. Specimens as large as this are extremely rare, the usual size being seldom larger than a man's head.

Calvatia gigantea usually grows in grassy fields and is found in nearly all parts of the world. It is said to be especially abundant in New Zealand. Most mycologists regard it as rare in America, and C. G. Lloyd, one of our most prominent students of the fungi, says he has seen it growing but once. This does not agree with the writer's experience, however, for he has seen hundreds of specimens growing in certain grassy fields in Pennsylvania, and when a boy found amusement in knocking the soft white globes to pieces.

The greatest interest that attaches to the puffballs in the popular mind is no doubt due to their edible qualities. Among the mushrooms there are certain poisonous species which require great care to distinguish, but this is not true of the puffballs. Thus far not a single poisonous species has been reported. There is a curious passage in Creevey's "Recreations in Botany," in reference to puffballs, that is worth quoting. "The common puffball," she says, "deprives one who has eaten it of all power of motion, while his consciousness still remains, thus producing a sort of terrible trance, resembling death." This amazing statement is likely to amuse those mycophagists who are wont to dine on puffballs almost daily while they are in season.

Some specimens are tougher than others, but all are edible, if collected while the inside is still pure white. The giant puffball is one of the tenderest of the group, and when sliced and fried in butter makes a most palatable dish. It is likely that in time efforts will be made to grow this plant just as we now grow mushrooms.

Average specimens are commonly too large for a single meal, but if one uses care, enough for a meal may be sliced from the top and the remainder will remain in condition for a long time. Indeed, removing part of the puffball seems to delay the process of ripening. Thus does nature play into the hands of the cook. Somewhere in the account of his travels Marco Polo tells of an ox he saw from which steaks could be cut and new ones would grow to take their places. If he had said puffball instead of ox, his tale would have come nearer to the bounds of possibility.

In the days of flint and steel the contents of a ripe puffball made an excellent tinder for receiving the sparks struck from the flint. It has also been used as a sponge, a styptic and a dye-stuff. At present its only use is a culinary one. If used before the flesh shows the least trace of color, it is a most palatable and nourishing food, being not unlike beefsteak in composition.

OUR ORCHIDS.

BY DR. WM. W. BAILEY.

IN a very general way most people know about orchids. Much has been written about them in general popular literature and in costly illustrated scientific works only accessible in libraries. Travelers have, in their records, incidentally, much to say of them, and their observations are often of value.

For a long time now there has been a craze or fad for orchids that was never equaled in plant history except in the mad seeking for choice Dutch tulips in the late Middle Ages. Daring collectors are out all over the world ever seeking new kinds. Upon those, fancy prices range easily into thousands of dollars for a single plant.

The most-sought exotics are nearly always air plants or epiphytes, as are also many gorgeous members of the pineapple family (Bromeliaceae). It is the practice of such plants to attach themselves to some other plant, or even inorganic support, from which they derive no nutriment whatever. They are nourished by the air, and possibly by whatever the peculiar spongy roots can obtain from rain or dew. In our finer hot-houses we see them hung in mid-air, attached to bits of cork or in wicker-work baskets, filled with sphagnum. The large pseudo-bulbs of these foreign species at once attract the visitors' attention, as do likewise the twine-like roots.

They are in no sense parasites; they commit no theft, only using neighboring plants for physical support; hence, they are of noble character. Parasitism is never commendable. All air plants are not, then, orchids. The writer often finds a misconception about this. Again, all orchids are not air plants; none of our native ones at the North are so.

What, then, constitutes an orchid? How is one to know them?

In the first place, they are monocotyledons or endogens, with parallel-veined leaves, one seed-leaf to the embryo, and stems of the general character of Indian corn, i. e., with no rings. They show also the characteristic numerical flower-plan of their class, the number six, though this is not carried out in full, as in a lily, or tulip, or iris.

In the orchids, one of the six perianth divisions differs essentially from the others, forming the labellum or lip. This is really the upper sepal, but by a twist of the ovary it is in most cases brought to the bottom of the flower. It may be merely fringed or ridged, or it may form a sac, or be hollowed into a bucket. It is frequently made attractive by brilliant and even varied colors, when it serves, in part at least, as a convenient platform or landing place for a visiting insect on the wing. Sometimes this same sepal is projected backwards, as in the genus *Habenaria,* into a more or less elongated spur or nectary. This contains the fluid sought by insects and so essential to the process of cross-pollination.

The perianth or floral envelope, really the calyx and corolla fused together, coheres with the one-celled ovary, in which the numerous dust-like ovules are situated on the walls. The stamens, one or more, rarely two, in number, are consolidated with the style and stigma, forming the column. The pollen is not powdery, as in most other plants, but agglutinated, as in milk weeds, into pear-shaped bodies (pollinia), furnished at base with a stalk and an adhesive disk.

All the family show extraordinary processes for cross-pollination. This differentiation, for the accomplishment of special important ends, places them, in connection with the marked adnation and coalescence of parts, at the head of monocotyledons, or near it. They form a very large family, widely distributed, but of little direct economic importance. Vanilla is about the sole plant of the group that is made use of by man. It must be borne in mind, however, that, owing to the extreme beauty or singularity of the flowers, they are widely sought, and command extravagant prices. Among the most lovely of created objects, it suffices them to be such, so, with compositae, they have been placed among the "royal families" that neither toil nor spin. While the compositae are royal mendicants often, there is no orchid that is not evidently regal; even the common green ones wear a high, aristocratic look.

Of our orchids, the lady's slippers are perhaps the most familiar. The showy lady's slipper (*Cypripedium specta-*

bile) is one of our very finest wild flowers. It is pure white, except near the base of the slipper, where it is painted with rich purple. The yellow lady's slippers are nearly as choice, and much more common. The purple or stemless species is the most frequent of all. It grows in dry, sandy districts. In New Brunswick I have observed that it is quite as often white as colored. Is not albinism developed in many species as we go north?

Once upon a time, way back in 1866, the writer had the good fortune to find in New Brunswick two specimens of the rare and beautiful *Calypso borealis*. Years afterwards he celebrated the event in lines to "Calypso, a Rare Orchid of the North," in the New York *Evening Post*. The peculiar effect it had upon him, as something classic and mystical, is sung into that poem, which has often reappeared in orchid literature. To discourage the young from the hope of sustaining the vital spark by verse, the author will add that he never received a cent for it. Stick to prose, young friends, and of that be chary.

A very beautiful, and still rather common, orchid, which, as it is uprooted and sold in great bunches in our city streets, bids fair to ere long disappear, is the *Arethusa bulbosa*. Its leafless stem arises from a bulb, often immersed in peat moss. The solitary flower is of a deep magenta, with a lip fringed with gold and spotted with deep purple and white. It is odorless, and hence easily distinguished from *Pogonia ophioglossoides*, a pretty flower, paler in color, which very closely resembles it. This has a green leaf, too, half way up its stem. Another species of *Pogonia*, dark, livid purple and green in its colors, is found semi-occasionally in dense woods.

Calopogon pulchellus is a beauty, even in its beautiful family. It grows in peat bogs or damp places, and is of a deep, rich magenta, a color of which Nature is fonder than man. It bears several flowers on a stem, each with an erect lip at the top of the flower. This goes to show that the ovary has not the usual twist of this family.

This article is already too long, or we might go on to enumerate and describe many other of our native plants, the fringed orchids, the maiden's tresses, the coral roots, etc. Mr. Weller's advice in letter-writing is, however, applicable to magazine articles as well. It is best to stop where the reader may demand more, or where one's feeling for the golden rule warns him to do as he would be done by.

Brown University, Providence, R. I.

BOTANY FOR BEGINNERS.—XXII.

ORDER 6—ARALES.

IN the older botanical works the palms and the arums were placed together in a division called the Spadiciflorae, in allusion to the spadix which characterizes many of them. But if we define a spadix as a fleshy spike of flowers, the palms would scarcely have a claim to being included. As a matter of fact, palms and arums are now placed in separate orders, but that they are closely related is shown by the structure of the flowering parts. Practically all of them have their flower-clusters surrounded by a large bract or spathe. It is interesting to glance back over the less highly organized orders of plant life and note the gradual rise of this bract. Among the grasses it is a mere green scale; in the palms it is often large and thick, but scarcely flower-like, while in the arum family it becomes thinner, of various bright colors and curious forms, and so petal-like that the whole flower-cluster, with its enclosing spathe, is often regarded as a single blossom. In reality, this kind of an arum "flower" is comparable with such a "flower" as the daisy, which consists of many small flowers in a head.

The representatives of the Araceae or *Arum* family within our limits are well known to botanists, because of the oddity of the flower-clusters, and when we survey the family as a whole we find that oddity is one of its strong characteristics. Most of the plants are herbs, but there are some shrubby species, and the stem forms range all the way from upright trunks and climbing vines to corms, tubers and rhizomes. These latter forms are well illustrated by such members of the family as the skunk's cabbage (*Symplocarpus*), Jack-in-the-pulpit (*Arisaema*), sweet flag (*Acorus*) and golden club (*Orontium*).

In the climbing species adventitious roots are usually produced and these may be of two kinds, one for clasping the support; the other for absorption. The absorbing roots generally grow downward until they reach the earth, but some species have roots with a spongy epidermis, which absorbs moisture from the air, like certain orchid roots.

The leaves, also, present great diversity of structure and range from long, narrow forms like those of the sweet flag to those of the Jack-in-the-pulpit, in which petiole and blade are sharply distinguished. In an Old World species of *Dracontium* the plant produces but one leaf a year, but this may become fifteen feet long. Curiously enough, although this is a monocotyledonous family, the leaves of most species are netted instead of parallel veined. In various species the leaves and rootstocks contain minute needle-like crystals that penetrate the mouth and throat when eaten and cause intense pain. The corm of the Jack-in-the-pulpit, called Indian turnip, is a familiar instance of this. These crystals are rendered harmless by heat or by drying. The Indian turnip is valued as a cough medicine when dried, and the roots of a tropical species of *Colocasia,* or taro, form the chief food supply of a large number of people.

The typical arum flower-cluster might be described as a fleshy spike, upon which the flowers are closely sessile, the whole surrounded or subtended by a bract or spathe. Often the bract is green, but it may be white, yellow, scarlet or other colors. Frequently it encloses both flowers and spadix, as in the skunk's cabbage; occasionally the tip of the spadix projects beyond it, as in the green dragon (*Arisaema dracontium*) ; again, it may be so inconspicuous as to seem absent, as in the golden club; while in the sweet flag it is so blended with the scape as to appear like an ordinary leaf. In an African species the spathe may reach a length of six feet.

The flowers, in keeping with the family's reputation for oddity, differ in many ways from the type. They are usually three-parted, as monocotyledon flowers should be, but some are two-parted. Some consist only of stamens and pistils, while others have a distinct perianth. In some, pistils and stamens are borne in the same flower; in others, pistillate and staminate flowers are in separate regions on the same spadix; and in still others, pistillate and staminate flowers are on separate plants. A single species often shows many gradations between these extremes, as for example, the Jack-in-the-pulpit, in which one may find all forms from strictly pistillate to completely staminate flowers, the best-nourished plants being invariably pistillate.

In this group the pistils ripen before the stamens and the flowers of necessity are pollinated by insects. This is also indicated by the colored spathes and spadixes and the strong odors various species emit. The fruit is usually a berry, bright in color when ripe, and in some cases edible. The well-known ceriman (*Monstera deliciosa*) is the ripened fruit of a climbing species common in cultivation.

Most of the arums are plants of the marshes and wet woodlands, and one species, *Pistia stratiotes,* the water cabbage of the tropics, is normally floating. There are more than a hundred genera and nearly a thousand species belonging to the group. They are widely spread throughout the earth, but most numerous in warm regions. It is estimated that 90 per cent of the species are to be found in the tropics. The Old World contains the greatest number of species, and it is noticeable that while the family is represented in both hemispheres the different genera are usually confined to a single continent. There are twenty-seven genera in the division of the family to which our green dragon belongs, and fifty species in its genus. *Phellodendron,* a tropical genus, has a hundred species. From this genus a large number of the climbing species come. In the genus *Anthurium* there are two hundred species. The genus *Acorus,* to which our sweet flag belongs, has but two species, one in Japan and the other widely spread in the north temperate zone. Our species is peculiar for seldom producing good seeds. As in other plants that spread readily by underground parts, the production of seed seems to be neglected.

One would scarcely think of putting the little duckmeats (*Lemnaceae*), so abundant on the surface of all still waters, in the same family with the arums, and yet there is where they undoubtedly belong. According to Rendle, they are smallest and least differentiated of seed plants. We can scarcely consider the plant body as consisting of distinct stem and leaves, but if we call the rounded outgrowths leaves, the stem in some species is about one twentieth of an inch long. In temperate regions the plants seldom flower, forming vegetative shoots instead. The flowers are very rudimentary, the staminate flower consisting of two stamens and the pistillate one of a single pistil. Of course such diminutive flowers are self-pollinated. At the base of the staminate flower there is a scale-like outgrowth which is regarded as a rudimentary spathe. There are but three genera and nineteen species of this group in the world, but they are spread in all waters, except those of the frigid zone. In our own region they grow so abundantly as to completely cover the surface of many ponds.

A MOUNTAIN MEADOW IN CALIFORNIA.

BY MARIETTE POWERS BENTON.

NEVER shall I forget the joy and surprise when one day as we were following a mountain trail it suddenly opened up into a little mountain meadow or cienaga, as the Spanish call it. We had been long absent, as it seemed to us, from our beloved New England meadows. But here, four thousand, three hundred feet above sea level, in the heart of the California mountains, were many of our old-time favorites. Golden-rod! Not once during our exile in this land of flowers (Southern California) had we seen a single plant. Here they were, recalling to our hungry mind the golden splendor of many a vanished autumn. Cardinal flower (*Lobelia splendens*), not a few plants only, but hundreds of large, dark red sprays. So vivid were they that we shut our eyes and opened them again to see if we were dreaming or awake. And, yes, there was one spray pure white. Columbine nodded and danced its cups upon the banks of the little brook. True, they seemed somewhat out of season, blooming beside golden-rod and cardinal flower, but they were none the less welcome. Elder berries shook their tempting bunches of purple fruit above our heads, while clinging to and climbing over everything was wild clematis, that roadside favorite of the Eastern States. But most pleasing of all were the evening primroses (*Oenothera grandiflora*). Many of them yet lingered into the sunshine, wide open, and fully three inches in diameter. Of course, we could not be content with one visit and so one moonlight night we wandered down to the little meadow again. It seemed like fairyland. Thousands of these evening primroses were swaying in the breeze, many of the stalks as tall as our heads. Almost, we felt we were home once more, but, alas, our eyes wandered to the surrounding hills. They, at least, were truly Californian, showing clearly the sage brush and dried yucca stalks, which in the moonlight seemed like an army of giant ghosts. To the traveler far from home it was a heartsome spot, and we could not see the strange flowers so happy were we with the familiar ones. Southern California, it is true, is a garden of flowers after the rainy season, but to the "Easterner" they are all strange and new, and one has to get acquainted before he can feel at home. So this little mountain meadow, filled with the flowers we had not seen for many moons, gave us more pleasure than the thousands of new strange flowers we had studied and puzzled over in our adopted state.

Riverside, California.

SUBSTITUTES FOR TEA.

TEA, or an infusion of it, is an aromatic drink, more or less astringent and stimulant. It aids the digestion and quickens the circulation by acting on the nervous system and the intellectual faculties. Now other plants have exactly the same qualities as the Chinese tea, but they have the great fault of being much cheaper. Every infusion of a plant that has the same properties as tea will have the same effects; thus the word "tea" has come to signify, in a general way, "digestive beverage," and we shall see that several plants may replace the real tea. One of them has already won a considerable place as a digestive drink, so much so that instead of "afternoon tea," we may some day have our "afternoon camomile." Everyone knows the camomile and its properties; it is tonic and stimulant, and one soon becomes accustomed to its slightly bitter taste. It is a French flowering plant, *Anthemis nobilis,* and the variety most cultivated is that with double flowers, which is more active than the wild single-flowered type.

What is called "European tea" is furnished by the officinal veronica (*Veronica officinalis*), of very aromatic bitter taste, whose flowering heads are used, fresh or dried, in the proportion of thirty grams to a liter of water [about an ounce to a quart]. "French tea" or "Greek tea" is a plant of Southern France, the officinal sage (*Salvia officinalis*), of strong and agreeable aromatic odor, whose flowering heads and leaves have a pronounced taste, hot and a trifle piquant; its properties are tonic, stimulant, and cordial.

The "Mexican" or "Jesuits'" tea is the product of the ambrosia (*Chenopodium ambrosioides*), a specie of "goosefoot" or "pigweed," an aromatic plant, a native of Mexico, whose flowers and seeds have stimulant properties. "Oswego" or "Pennsylvania" tea comes from a horsemint (*Monarda didyma*), a beautiful plant of American origin, often cultivated in gardens for its beautiful scarlet flowers. Its leaves yield an agreeable tea.

The "Canada" or "mountain" tea, called also "read tea," is the product of the common wintergreen (*Gaultheria procumbens*), whose perfumed leaves are used for this purpose.

The author goes on to cite a considerable number of other shrubs whose leaves and flowers may be used to make a substitute for tea. Among these the only familiar ones are the Paraguay tea (*Ilex paraguayensis*), so largely used in South America, and the "false tea" (*Lantana pseudothea*), employed in Brazil.

It may be seen that there is great choice of plants that may be used for tea; every country has found its own, so to speak, by looking among the weeds that spring up in its own fields. The digestive and stimulant qualities of these teas of course vary with the species, and it is proper to select those that possess them in the highest degree. We incline to believe that the Roman camomile holds first place, but it is easy to try a large number of other teas whose plants may be found in the gardens, for here we must not discuss tastes, and each plant has its own peculiar flavor.—*From an article in American Grocer.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

PINE FORESTS.—In Step's "Wayside and Woodland Trees" we are told that there can be no such thing as a pine forest, for the old German word *forst,* from which our word forest is derived, means pine. A forest, then, is properly an assemblage of *pine* trees.

THE HACKBERRY FOR SHADE.—The editor of *Arboriculture* recommends the hackberry (*Celtis occidentalis*) as a shade tree. It is a clean tree, free from insects and produces an abundance of berries much liked by the birds.

The foliage is so elm-like that people who go to the woods for their shade trees often dig up the hackberry for the elm by mistake. In the East the hackberry appears seldom to attain great size, but in the Middle West trees eighteen inches or more in diameter are common.

THE WIZARD OF HORTICULTURE.—This magazine does not usually publish poetry, even if paid for at advertising rates, but so many astounding things have been claimed for Burbank in the daily press, that we are tempted to quote the following from *Gardening*:

O, Mr. Burbank, won't you try to do some things for me?
A wizard clever as you are can do them easily.
A man who turns a cactus plant into a feather-bed
Should have no trouble putting brains into a cabbage head.

CORRELATION OF COLOR.—It is a curious result of the correlation of color that red flowers should almost invariably have black seeds. Thus when one is planting mixed seeds of a garden variety having flowers of more than one color, he may select out the red-flowered sorts by the color of their seeds. Black seeds themselves have the red coloring, anthocyan.

THE MULLEIN IN THE WEST.—In the October Note and Comment I saw a note in regard to mullein in the West. I have never seen the plant in Southern California, but on a recent trip through the old mining region about Placerville I observed it frequently. I noticed occasional plants by the roadside, but its favorite place of growth seemed to be hillside clearings in the pine forest, especially where brush had been burned recently. The plants were of medium height, and did not seem to mind the prolonged summer drought in the least. I did not notice any plants below fifteen hundred feet elevation, but above that they seem to be slowly spreading. As near as I could learn from old residents they have been introduced for a long time, probably ever since '49.—*W. Scott Lewis, Los Angeles, Cal.*

PEDIGREE OF THE EVENING PRIMROSE.—The evening primrose (*Oenothera*) may not belong to the most aristocratic of floral families, but, owing to its usefulness in exemplifying the mutation theory of the origin of species, the pedigree of certain specimens may be traced back for a greater distance than that of other flowers. Some have a known pedigree extending back for twenty years, at least ten generations.

MAKING NEW SPECIES.—It has been found by Dr. D. T. MacDougal that the injection of various substances into the ovary of certain plants will cause the seed in the resulting capsule to produce plants unlike the parent in one or more respects. It may therefore be questioned whether the "sports" that sometimes occur among large numbers of seedlings may not be due to some injury to the ovary while the seed was forming. If the character of the plant can be influenced by stimulation of the ovary, some wonderful possibilities seem within our grasp.

VITALITY OF CATALPA.—In the January number of *Arboriculture* there is a photograph of a long line of catalpa trees that have originated from fence posts. The posts were set with the bark on and immediately sprouted. At present the sprouts are much larger than the original posts. The same magazine is authority for the statement that such sprouting is a common occurrence with this species. Hitching posts, props, and the posts under the foundations of houses when made of this wood are likely to produce new trees. One may thus grow two new fence posts while the original is wearing out, a unique idea in forestry.

Editorial.

Shortly after the October number of this magazine was issued, the printer with whom we have a contract for the work decided to move his establishment to Ashland, Maine, where the numbers for the remainder of 1905 will be printed. As we write, the November issue is in type and the December number will follow immediately. It is not our intention, however, to wait for the completion of these numbers to begin Volume X. We have selected another printing house and this initial number will appear on time. All our present subscribers will receive the numbers to complete the preceding volume, whether they continue as subscribers or not, but we trust that none will fail to renew. The amount of ill luck that has attended our attempt to issue a well-printed magazine on time would be amusing if it were not so serious a matter to subscribers. We take pleasure in noting, however, that during the publishing of the nine preceding volumes, subscribers have received more than we agreed to give, and that we have not attempted to economize, even when the numbers were late, by issuing two numbers in one. This record, we trust, will merit a renewal of your subscription.

* * *

With this issue we send out bills for 1906 with arrears, if any, added. The magazine is sent until ordered discontinued, and, if any do not wish to subscribe for this year, we should be notified at once. Thus far we have found very few who have discontinued after once subscribing. The contents of the magazine attract a substantial, thoughtful class of readers who do not change from one thing to another without good cause. All such will be glad to know that the magazine for 1906 will follow the usual standard. The articles on the flowering plant families will be continued, a frontispiece will appear in each issue, and the Note and Comment department will remain an important feature. We solicit a continuance of contributed notes and longer articles from our readers.

* * *

Look over your files and if any numbers are missing later than Volume VII we shall be glad to supply them free. We can no longer make this offer for the earlier volumes, because recent orders have so reduced our stock that no single numbers are available. If any reader of this magazine has not a full set of the back numbers, he will later regret that he did not secure them while he could. A large proportion of our new subscribers order full sets from the beginning. This is especially true of libraries. If you do not care to own a full set, ask the nearest library to order one, so that you can refer to it when desired. When our stock is gone it will be too late.

* * *

Last autumn *The Garden Magazine* announced that it would soon give a gold medal to the cultivator who first showed that it was possible to grow fringed gentians from seed. Upon receipt of this notice we at once claimed the prize for Mr. J. Ford Sempers, of Aikin, Md., who raised the plants from seed five years ago, and whose observations on their germination and growth have appeared at various times in the AMERICAN BOTANIST. In spite of this, the prize went to Mr. Thomas Murray, of Tuxedo Park, N. Y., whose experiments did not begin until a year later than Mr. Sempers', and whose published results did not appear until December, 1905. In fact, the successful work of Mr. Murray was not begun, as appears from his account, until

1903. The pretext for ruling out Mr. Sempers' claims was that he had not published full cultural directions. It is noticeable, however, that at the time Mr. Murray was awarded the medal he had published no cultural directions whatever. The whole medal performance, therefore, has the semblance of a magazine presenting bouquets to itself merely for advertising effect. The medal is inscribed, "For raising fringed gentians from seed." Nothing was said about cultural directions until our candidate appeared. If *The Garden Magazine* has any more medals to give away we venture that the editor will look carefully through the files of AMERICAN BOTANIST before committing himself.

BOOKS AND WRITERS.

After Dr. J. M. Coulter's "Plant Relations" and "Plant Structures" had been issued, the two were combined in abridged form to make a volume called "Plant Studies." This latter volume, worked over and rearranged, has now appeared as "A Text-book of Botany." The book begins with a study of leaves and runs on through stems and roots to the germination of seeds. Then begin studies of typical plants, to illustrate the principal plant groups, and the book ends with chapters on plant breeding, forestry and plant societies. In the opinion of the reviewer the latter half of the book is by far the better. The work, however, is very well done and the book is likely to retain the place its predecessor made in the estimation of teachers of botany. There is an abundance of good illustrations that help greatly in elucidating the text. (New York, D. Appleton & Co., 1906.)

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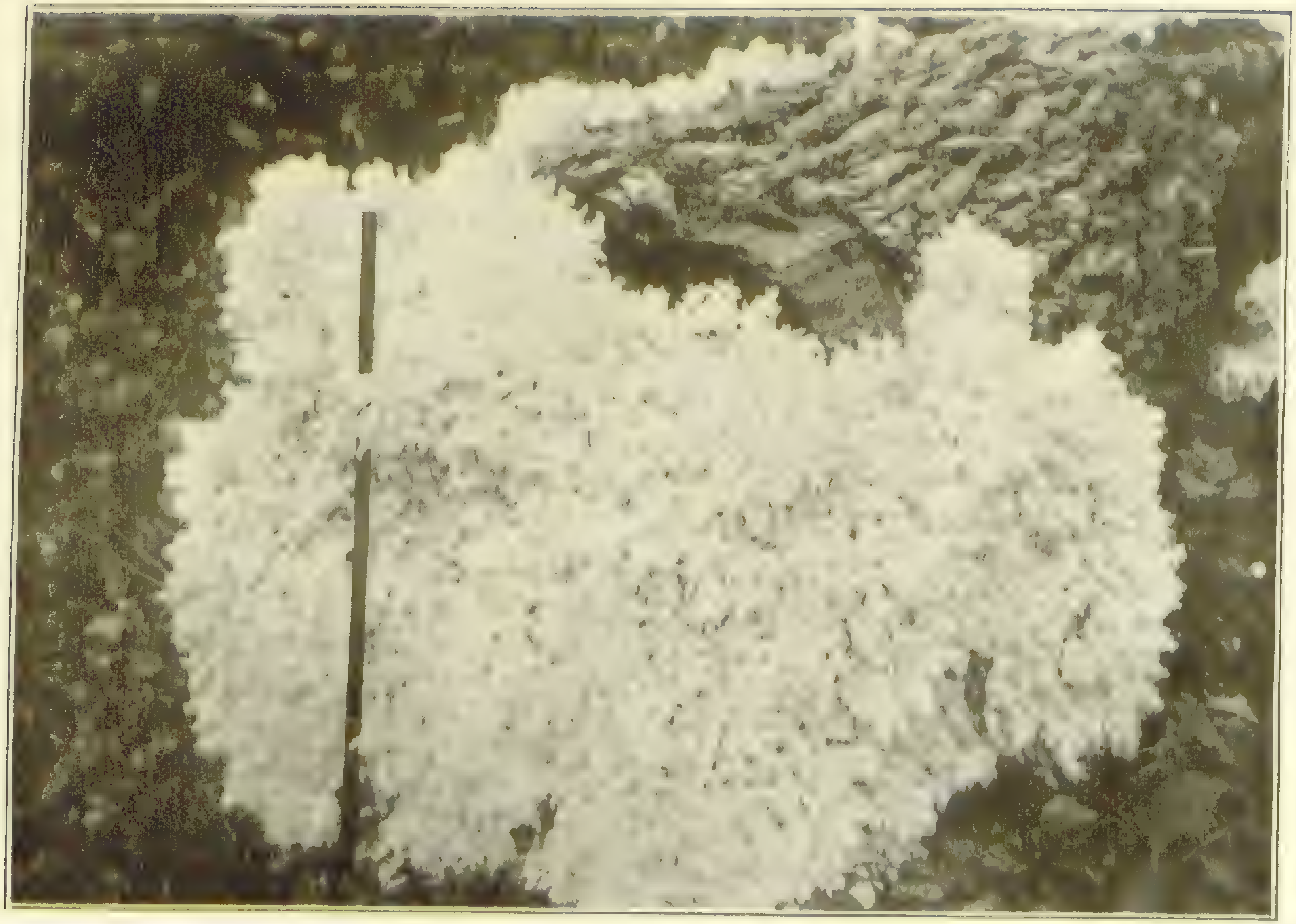

THE CORAL MUSHROOM—Hydnum Coralloides.

THE AMERICAN BOTANIST

VOL. X. JOLIET, ILL., FEBRUARY, 1906. No. 2

THE CORAL MUSHROOM AND ITS ALLIES.

THE forms that are comprised in the great group of the Fungi are so numerous as to species and so varied as to form that none but the scientist dares to set the bounds of the mushroom family. Popularly, of course, there is but one mushroom—*the* mushroom—and all the rest are toadstools; but the scientist would not agree with this definition. He claims that there are more than a thousand species of mushrooms in America, alone, and several times as many more in the rest of the world. We commonly think of the mushrooms and toadstools as little umbrella-shaped growths of various colors, but here again the scientist disagrees with us and claims many apparently incongruous forms as relatives of the family.

We may, perhaps, gain a better perspective of some of the closely related families of the higher fungi if we reflect that what may be called the true mushrooms—the *Agaricaceae*—bear their spores on the surface of thin plates that hang downward from the umbrella-like top of the fruiting portion. In the Boletaceae these plates are replaced by a cushion-like growth, made up of numerous small tubes, on the inner surface of which the spores are borne. The members of the Polyporaceae have a similar cushion of spore-bearing tubes, but are distinguished from the Boletaceae by being usually hard and woody, and by the tube-bearing portion not readily separating from the cap that bears it. In the Clavariaceae the spore-bearing layer is confined to the upper parts of erect branching masses, like the antlers of miniature deer. The Hydnaceae, to which the subject of our sketch belongs, seems at first glance to partake of the characters of all the others. Some species have a circular cap and central stem, like a well-ordered member of the Agaricaceae, others might be mistaken for species of *Boletus* or *Polyporus,* while still others might be confused with the Clavariaceae. The key to this identification, however, is found in the fact that no matter what their shape, their spores are borne on tooth-like projections that invariably point downward from their place of origin.

Like all their relatives the members of the genus *Hydnum* are saprophytes, living on the dead and decaying bodies of other plants. A spore happening to alight upon a decaying log or dead tree may give rise to a tangle of fungus threads that in time will penetrate to the farthest cells and send up, season after season, from every available point, the fruiting parts. In the present instance the fruiting parts consist of great quantities of creamy-white fruiting branches whose delicate beauty has few equals in nature. It is said that Elias Fries, one of the fathers of mycology, was first attracted to the study of the fungi by the sight of this beautiful plant in the Swedish forests.

Though the group to which our species belongs is often called the prickly fungi and hedgehog fungi, the name of coral fungus or coral mushroom is so appropriate for the plant shown that it persists in spite of the fact that, as we have shown, it is not a mushroom. Its scientific name, too—*Hydnum coralloides*—hints at its form; in fact, so much does it resemble coral that the reader will be likely to identify it without a book, when he next finds it. Pushing out from some convenient crevice in the log upon which it is growing, the growth branches and branches again until it ends in slender twigs, which are thickly set with round, awl-shaped spines, all of which point downward. This latter feature, alone, is sufficient to distinguish it from the various species of *Clavaria* which sometimes grow near it. It is said to grow from six to eight inches across, and this, indeed, is the average size, but the two-foot rule in our illustration shows that the specimen from which the photograph was made was quite four feet across. The plant grows upon standing or fallen timber, and when growing upon dead trees often decorates them from base to summit with cluster after cluster of the beautiful sprays. It exhibits great latitude in the choice of a log upon which to grow and has been found upon fir, oak, ash, birch, hickory, maple and beech. It is said to be most common on beech, but the illustration is from a specimen growing on maple. For at least ten months in the year, one might pass the log in which it was growing without being aware of its presence. Not until the September rains come do the fruiting parts appear, and as soon as the spores are shed they shrivel.

The bear's head *Hydnum* (*H. caput-ursi*), is said to be more common than the coral mushroom, but we have not found it so. In this latter species the spines are longer, often reaching the length of an inch, and are inclined to be assembled in groups at the ends of the short branches. It apparently never grows as large as *H. coralloides,* though the Lloyd Museum has a specimen that must have been twenty inches in diameter. The Medusa's head *Hydnum* (*H. caput Medusae*), scarcely branches. It has longer spines than the preceding, and the upper ones are inclined to twist about in imitation of the snaky locks of the mythological personage for whom the plant is named. This species is not common, but if found may be further distinguished from *H. caput-ursi* by the fact that it turns to ash color in drying, instead of becoming brown. The Satyr's beard (*H. erinaceum*) is another species that is not uncommon. In this the spines often reach a length of four inches.

All the species here mentioned are harmless, mild, tender and edible. Some of them have a slightly acrid or bitter taste, which may be removed by parboiling for a few minutes. They may then be stewed with milk or treated as other edible fungi are. When one is fortunate enough to find it in quantity, it may be made the base of many palatable meals. The specimen illustrated was found in the Forest of Arden two years ago, by Mr. H. C. Skeels. During the winter a section of the log was removed to a shady place near his home, and last autumn bore such an abundant crop that all his acquaintances dined upon it frequently. Nearly a hundred pounds of edible fungus was removed from this section. Our photograph is made from the section left in the forest. When the spores ripened an effort was made to plant it on other logs by inserting spores in the most likely places. Whether this was successful or not remains for another season to tell. Our photograph was made by Prof. V. D. Hawkins.

THE UPAS TREE.

(*Antiaris Toxicaria.*)

DR. WM. WHITMAN BAILEY.

THERE is no more famous plant in the world than the upas tree of Java. It is made to point a moral and adorn a tale. All sorts of dreadful stories have been told about it, till "the deadly upas" has become a by-word and a figure of speech. Most of these legends are, however, grossly exaggerated. The tree *Antiaris* is certainly poisonous to a degree, and many persons have been dangerously affected by climbing after its flowers or fruit. Still, we must totally discredit the more romantic and thrilling tales. They will do to take place beside the story of the arboreous, man-eating *Drosera,* famous some thirty years ago. Where a thing is not inherently impossible, it is easy to build up an agreeable and widely accepted anecdote. One plant, then, may be, like upas, extremely poisonous; another, like *Drosera,* small, but an expert fly-trap. All that is necessary to create a legend is to intensify the poison in the one case and magnify the plant and its prey in the other.

The entrancing and misleading tales of upas, it seems, were first circulated by a Dutch surgeon, about the close of the last century. This account, which has been constantly repeated and embellished during all these years, represents the tree as growing in a desert region a long distance removed from any other plant. Condemned criminals and political offenders were offered a chance for life if they would venture to visit the tree and collect some of its poison. In the case of a ward boss or county politician this might appear to be a case of Newcastle seeking coals—or Rhode Island, clams! Be that as it may, the victim was safe-guarded as far as possible by reputed antidotes and nostrums, charms, and talismans, but it is said that only two out of every twenty returned alive!

A graphic account was always added to the picture of the ground about the tree strewn with the bleaching bones of the unfortunate victims—

"The bodies and the bones of those
  That strove in other days to pass
Are withered in the thorny close,
  Or scattered bleaching on the grass."

The aforesaid Dutch surgeon, whose name was Foresch, states that "there are no fish in the neighboring waters, nor has any rat, mouse, or any other vermin been seen there; and when any birds fly so near this tree that the effluvia reaches them, they fall, a sacrifice to the effects of the poison." He proceeds even to draw a longer bow by asserting that "out of a population of 1,600 persons who were compelled, on account of civil dissensions, to reside within twelve or fourteen miles of the tree, not more than 300 remained in less than two months!" When one tells a fish, snake or bear story, he should not be staggered by facts, but represent his creature as the biggest of its kind!

Foersch tells us, too, of experiments he personally witnessed, where the gum of the tree was used in the execution of several women; this by order of the Emperor. But, as the tree has long been grown in botanic gardens without danger to life or limb, we are obliged to dismiss these accounts as chimerical. The painful question of veracity is, fortunately, not for us to debate. Even the most honest travelers, as Mungo Park, Sir John Mandeville, Messrs. Huc and Gobet, and Robinson Crusoe, may prove credulous and accept too much on hearsay.

It is quite possible, moreover, that the stories grew up in a perfectly natural way. In the first place, the plant is confessedly noxious. Then, it frequently grows in low basins, or valleys, rendered dangerous by the escape of carbon dioxide from volcanic vents. This gas, as everyone knows, is very heavy and is retained in such depressions as in the cavern of Pausillippo in Italy and elsewhere. Sulphurous acid, equally deleterious, is also given off by these vents, "so that doubtless the upas tree has had to bear the opprobrium really due to the volcanoes and their products." The plant is, however, unquestionably virulent. "The inner bark of young trees, which is fashioned into a coarse garment, excites a most horrible itching." Is this the classic shirt of Nessus? "The dried juice, mixed with other ingredients, forms a most venomous poison, in which the natives dip their arrows."

The tree belongs to the family *Artocarpeac,* nearly related to hemps and nettles. It is monoecious, with unattractive flowers.

Brown University.

BOTANY FOR BEGINNERS—XXIII.

ORDER 7—XYRIDALES.

NEXT to the great *Arum* family, in most systems of classification, comes a queer group of diverse forms, that the botanist in temperate regions is likely to know little about. We have representatives of most of the families, to be sure, but the great bulk of the species are inhabitants of the tropics. These species have a curious predilection for the American tropics. Some whole families are exclusively American and the others are most abundant on our side of the world. These families are at present grouped into the order Xyridales, but were formerly called the Farinosae. The seeds in most of the species consist of a tiny embryo surrounded by a great quantity of mealy albumen and this circumstance gave to the order the name formerly used.

Besides the yellow-eyed grasses (*Xyris*), whose generic name gives the present name to the order, the group is represented in our latitudes by the pipeworts (Eriocaulaceae), the wild pines (Bromeliaceae), the spiderworts (Commelinaceae) and the pickerel weeds (Pontederiaceae). Our species are, in every instance, the hardiest members of their race, but seldom extend their territory very far northward. Many of them, indeed, get no farther than our Southern States. This is particularly true of the Bromeliaceae. In most of the plants, no matter in what part of the earth they occur, a decided liking for a watery habitat is seen. This is most noticeable with us in the pickerel weed and pipewort. Such members as do not take kindly to the water often go to the other extreme and become xerophytes. Nearly all the Bromeliaceae are epiphytes and so constructed that they can go a long time without water.

In structure the flowers approach the typical monocotyledon flower. In most cases the perianth is divided into calyx and corolla, and the latter is usually brightly colored, indicating that the flower is pollinated by insects. Each flower, however, is commonly subtended by a bract of some sort, which may be taken as one indication of their relationship to the arums. In many forms the stem does not produce lengthened internotes, and this results in the basal rosettes seen in the pipewort, the pineapple and in a measure in the yellow-eyed grasses.

Of the pipewort family we have barely half a dozen of the five hundred species. A single genus common in South America has more than two hundred species. The little seven-angled pipewort (*Eriocaulon septangulare*) is probably our commonest species, being quite noticeable about midsummer when its tiny, white, button-like flower-heads begin to appear along the borders of quiet ponds. These flower-heads are fairly typical of the family. Each consists of an outer involucre of scale-like bracts surrounding a cluster of flowers. The outer flowers are likely to be staminate and the inner pistillate, but in other species this arrangement may be reversed. From the resemblance of the flower-cluster to that of the asters, Rendle calls them "the Composites of the Monocotyledons." The flower-cluster is often woolly. Although most abundant in the American tropics, this family is spread throughout the world, chiefly in the warmer parts.

The yellow-eyed grasses, as their name indicates, are grass-like in appearance until they come into bloom. Then the spherical or oblong heads of overlapping scaly bracts, from each of which a yellow flower appears, at once indicates the difference. There are usually but one or two flowers in a head open at one time, which gives the inflorescence a ragged appearance. There are scarcely more than half a hundred species of this family, mostly in the tropics.

Our single representative of the Bromeliaceae is *Tillandsia usneoides*, the plant so conspicuous in the Southern

States and known as long, gray or Spanish moss. It is not a moss, however, for it flowers and fruits abundantly. Further south there are nearly a thousand species, but comparatively few of them moss-like. The well-known pineapple is a species of this group and a large number of the other species are fashioned on the same plan. On this account they are usually known as wild pines. The common pineapple grows in the soil, but many of the others are found high up on the branches of other trees. Unable in such positions to draw a supply of nitrogen from the soil, the sheathing leaves form reservoirs in which drowned insects and decaying vegetation collect and are then absorbed for the nitrogen they contain. The Spanish moss has leaves covered with fine scales, which absorb water from the air. The flowers of this group are often brilliantly colored and the bracts that subtend them frequently take part in the color scheme. The flowers secrete nectar about the ovary and appear to be cross-pollinated. The seeds are in many instances provided with a feathery pappus, which enables them to travel about in the air until a favorable site on the branch of a tree is found.

The spiderworts are more abundant in our region, but still are a mere handful compared with the more than three hundred species in warmer regions. Most of the species are noted for the short duration of the flowers, which, however, are brilliantly colored, and probably remain open long enough to entertain the pollinating insects. There is some evidence to prove that some of the flowers are capable of self-pollination. In an Old World species (*Commelina Benghalensis*) cleistogamous flowers are produced from the rhizome.

The pickerel weeds form a small family of less than twenty-five species, four of which belong to our part of the world. The common pickerel weed (*Pontederia cordata*) is famous for having three forms of flowers—with long, short and medium lengths of styles and stamens. Darwin was especially interested in them. Among the writer's valued possessions is an autograph letter from Darwin to Asa Gray, asking for information on the subject. The water hyacinth (*Piaropus crassipes*) is also a member of the Pontederiaceae. At the North it is often cultivated for its handsome flowers, but in the bayous and sluggish streams of the South it has become something of a pest, growing so luxuriantly as to entirely cover the water. It is said, however, that cattle are fond of the succulent leaves, and what was once a pest may in time come to be a valued crop.

A VEGETABLE TRAMP.

BY WALTER ALBION SQUIRES.

OF all the plants I have known, there seems to be none so deserving of the name of tramp as the common mullein. Like its human prototype, it is a wanderer in many climes and warms itself on the sunny side of railway embankments from Maine to California. It is a dweller by the dusty roadside and in the rocky pasture. An outcast of the vegetable world, at home in any spot, and yet forever homeless, it dwells beside the garbage heap and sends up its tall spikes amid the tin cans and dismantled bed-springs of every dumping ground throughout the land. It seems to cling especially to the outskirts of large cities, though it is also found far within the wilderness. In the West I have often seen it standing in autumn and winter, tattered, ragged and brown, on the rocky bars of rivers, in the vicinity of towns. These river bars are also favorite gathering places for other wanderers—human derelicts, the abandoned of mankind. Here, crouched upon the sand, their only habitation the sheltering willows, and with the rounded pebbles for their hearthstone, they watch and tend the fire beneath the coal-oil can, which contains their heterogeneous fare.

About twenty miles west of our old home in Northern Kansas was a portion of that long line of low mounds in which the Dakota sandstone stretches nearly across the state. One day my brother brought back from these mounds some mullein stocks, the first I had ever seen. With boyish interest I wished to see what the living plants were like, and scattered the seed about the barnyard and pasture. I soon forgot all about the mullein seed and never suspected the nature of the few large woolly leaved plants which made their appearance the following year. But the year after they soon made themselves known by sending up their long spikes of yellow flowers. They seemed to thrive for a while and increased in numbers, but after a time their numbers grew less and in a few years they were gone. The old barnyard and a certain rocky portion of the pasture where they grew would seem to have been an ideal place for them. It would almost seem as though they, like their human kindred, had lived so long on the "seamy side," had wandered so far and wide, that they could no longer settle down in any place, however favorable, but must needs yield to the instinct to rove and be off again.

I have seldom been in a locality where a few plants of the mullein could not be found. I have frequently noted it throughout Kansas, Missouri, Iowa and Illinois, as far as the shores of the Great Lakes. On the Pacific Coast it seems to be fairly abundant throughout the Sacramento Valley, the Rogue River Valley and the Willamette Valley, and about the Puget Sound country. Here in Northern Idaho I have found it at high elevations, far back in the wilderness. To what extent it is to be found in the great arid tracts of the West I am unable to say, but I found it quite plentiful far out upon the plains in the country about the Cimarron River. It did not appear to be affected there by the dryness of the climate, though the abundance of cacti, yucca and artemisia, together with other xerophytic vegetation, plainly indicated the beginning of the desert.

The mullein has been so long a wanderer, and has invaded so many lands, that it is difficult to determine its original home, though it is doubtless a native of some part of Europe. Some idea of the length of time that has elapsed since man became acquainted with it may be gained from the fact that the word mullein came down to us from the Anglo-Saxon, and it is not improbable that our Teutonic forefathers were acquainted with it long before they crossed the English Channel.

Kooskia, Idaho.

ABOUT NUTMEGS.

THE nutmeg of commerce is the aromatic achene of one of several evergreen species included in the genus *Myristica*. It is a native of the Moluccas, but is also distributed to the neighboring islands of the East Indian Archipelago, where it occurs in gregarious groups locally known as nutmeg-groves. During the ascendancy of the Dutch in the East Indies, it was the chief economic product of the Spice Islands, but its commercial value, like that of pepper, has declined considerably in recent times. It is, however, still valuable enough to make its cultivation profitable to the local agriculturist, for even in India it at present sells at from a quarter to half an anna per nut, not to mention the scalet aril or mace, which is even more valuable than the nut itself. The evergreen forests of the moister regions of India and Burma contain several species of wild nutmeg. The *Myristica longifolia* and

M. attenuata may be mentioned as two common examples to illustrate the prevalence of the genus there. But the more delicate dark-foliaged *Myristica fragrans,* the source of the commercial product, is by far the most important and valuable member of the group. This species occurs in India only under cultivation. It was introduced by the Dutch into the island of Ceylon, whence in time it came to be disseminated over the mainland of peninsular India. It flourishes in all warm, moist localities, particularly if these be situated on or near the banks of rivers. It demands a rich, free, well-drained soil and an abundance of aqueous vapor in the air.

Besides the ordinary uses to which nutmegs are applied in India, they are now-a-days very much in requisition in Europe for the manufacture of the substance known as "nutmeg-butter." This remarkable product is only the essential oil of the nutmeg, which is a solid or fat at all ordinary temperatures. It furnishes an example, which is rare in the vegetable kingdom, of a volatile oil combining with a fixed oil to produce a solid glyceride or fat. Nutmeg-butter is used in Europe in the manufacture of scented oils, perfumes and soaps, but chiefly as a flavorant in cooking and confectionery.

The great point in favor of nutmeg fat is that, like the oil of bennuts (*Moringa pterygosperma*), it does not turn rancid, even after long keeping, and may be prepared in any quantity for home consumption.—*From an article in Indian Planting.*

INSECT GALLS.—Those who are inclined to a further investigation of insect galls, to which Mr. Dobbin called attention in the November number, will find a pamphlet by Wm. Beutenmuller, issued by the *American Museum Journal,* of New York, very interesting and helpful. The price is 15 cents.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

STRAY-BERRY.—According to *Gardening World,* the strawberry was originally called stray-berry, from the habit of its runners in straying from the parent plant.

AGES OF FUNGI.—The mushroom is often referred to as typical of rapid growth and equally rapid decay, but some of the woody fungi are among the most enduring of plants. According to Atkinson, some of the shelf-fungi (Polyporaceae) may live to be eighty years old.

THE FRENCH MULBERRY.—In late autumn certain parts of Eastern Kentucky and Tennessee are bright with the magenta colored berries of the French mulberry (*Callicarpa Americana*) that do as much for the landscape as do the berries of the winter berry (*Prinos verticillata*) farther north. The mulberry is fond of old fields and waste places and would seem a very desirable species for decorative planting in regions where it will grow.

MENTHOL.—Menthol, sometimes known as peppermint camphor, is a solid constituent of peppermint oil. It is said to be obtained by cooling peppermint oil to a very low temperature. Although we commonly think of this oil as being derived from *Mentha piperita,* there are several species of mint from which an oil with properties resembling it may be obtained. It is said that Japanese menthol differs slightly from the American product in odor, because that produced in Japan is made from a different species of mint.

Peppermint Oil.—According to a recent bulletin of the United States Department of Agriculture, this country seems to be the chief producer of peppermint oil. In addition to what is used at home, we annually export from 50,000 to 100,000 pounds. The price ranges from 75 cents to $4 a pound, depending upon the supply. The plant from which the oil comes is the well-known peppermint (*Mentha piperita*) and its varieties. It grows wild in many regions and although called American mint, is an immigrant from Europe. The oil is obtained by distillation.

The Skunk's Cabbage.—In late spring and early summer the broad leaves of the skunk's cabbage are busy making the starch which is stored underground in its thick rootstock. When the great flower-clusters start upward this store of starch is drawn upon as the material from which the tissues are built and energy furnished. Some of this energy appears as heat, as may be easily seen by the use of two thermometers that register alike. Suspend one near the spathe and place the bulb of the other inside the spathe. The latter will soon indicate a higher temperature. It is interesting to note that our common species is also found in Japan.

Sugar from Trees.—So accustomed are we to the manufacture of sugar from the sap of the maple that we are likely to think this the only tree from which sugar may be obtained. As a matter of fact, the sap of many trees contains sugar in appreciable quantities and might be turned to good use were maples less abundant. This is the case with the butternut *(Juglans cinera)* and the black birch *(Betula lenta)*. Both these trees produce an abundance of sap, but in this respect are exceeded by the yellow birch (*B. lutea*), though its sap has less sugar. The butternut sugar is said to taste much like maple sugar. The sap is obtained, as in the maple, just before the buds unfold. In other lands several species of palm yield sugar.

SEEDS AND LIGHT.—It is commonly supposed that seeds need light to germinate. This error is, no doubt, due to a confusion of the requirements of seeds and seedlings. Seedlings need light, of course, but we have only to reflect that nearly all seeds germinate too deep in the earth to receive any light. We may say, then, that ordinary seeds do not need light for germination; in fact, it is said that the seeds of larkspur and poppy will not germinate when exposed to the light, and the same has been proven true in the case of *Acanthostachys strobilacea* and *Phacelia tanacetifolia.* Notwithstanding this, the seeds of plants that do not naturally grow in soil may require the light. In *Drosera capensis,* one of the sundews, and in the mistletoe (*Viscum album)* light is said to be necessary to germination.

THE TUBERS OF THE ARROW-LEAF.—Man has apparently made use of but a small part of the plants that are available for food. Nearly all the species of arrow-leaf (*Sagittaria*) produce tubers in the fall which in some cases reach the diameter of an inch or more. They are filled with starch, somewhat like the ordinary potato, and designed to continue the life of the plant in spring. The Indians, who from necessity used many articles of food that we do not, knew and relished these *Sagittaria* tubers, and the Indians of the Northwest called them by a name which means swan potatoes. No doubt the size of the tubers could be easily increased by cultivation and there are at present many acres of wild, boggy land in which the wild plants grow almost to the exclusion of all else. All we need is a botanist with Burbankian tendencies to acquire a new food plant.

THE MULLEIN IN THE ROCKIES.—Since writing the note for the October number of the AMERICAN BOTANIST I have found other data in regard to the distribution of mullein in Colorado. I find it is frequently found around Boulder and other places not familiar to me. However, the problem of distribution is not solved, as the mullein plant is indigenous to Europe, introduced westward and throughout the United States as far west as Eastern Kansas. Britton and Brown in their flora mention the probability of one species being naturalized in the West, and Prof. Aven Nelson, in his small manual, records *Verbascum thapsus* as growing in Wyoming. However, in his "First Report on the Flora of Wyoming," issued in 1896, no mention is made of mullein. All the plants I have seen here grew practically in xerophytic conditions. What agent or agencies has brought it to the foot of the Rockies is the question.—*Earl Lynd Johnston, Evans, Colo.*

SHALLON.—Since I sent you my last shallon article I have had access to the Journal of Lewis and Clark and have hunted out the first reference to shallon ever made in literature, as I understand it. They were well along down the Columbia River, not far from where I found my spray of flowers. The eating of roots, barks and berries had made them all sick. Clark reports that he was very weak and unable to eat on account of stomach disorder. On December 9, 1805, Clark writes: "In the evening an old woman presented a bowl, made of a light-colored horn, a kind of surup made of dried berries, which is common to the country, which the natives called *shele wele* * * * they gave me senip made of bread of the shele wele berries mixed with roots." Here we have it as Clark wrote it first of all: *shele wele.* But on the page before me, both in parenthesis and by reference to bottom of page, is explanation of the editor that Clark meant she-well, salal, sallol or shallon. It is worth knowing that Captain Clark wrote the "old squar's surup" was made of berries which the natives call shele wele, and that the senip was made of bread of shele wele berries.—*W. W. Munson, Pasadena, Cal.*

Editorial.

In common with all other magazines, we annually receive a large number of applications for sample copies from people who subsequently do not subscribe. Of course, all have their reasons for not subscribing, but it strikes us that if we could find out what these reasons are, discover what the non-subscribers are looking for and give it to them, we would obtain the very thing *we* are looking for, namely, a larger subscription list. We have therefore selected from the list of applicants received during the last three months certain persons to whom we shall send a marked copy of this note. To all who receive this marked copy we make the following offer: To the writer of the best criticism of the magazine received before March 15th we will give a year's subscription and a 50 per cent discount on the price of all back numbers, if desired; to the writer of the second best criticism we will give a year's subscription and a 25 per cent discount on the price of back numbers, if desired; and to all who send criticisms we will send a free copy of the March number. It will be seen that letters praising the magazine will stand no chance at all. We do not want praise; we want pointers. If we cannot find out why you, personally, did not subscribe, we cannot make the magazine so that it will attract, in future, people with tastes like yours. Is the magazine too technical or not enough so? Do you prefer more illustrations? Would you rather have mere pictures than text that is of interest? Do you prefer more articles about collecting? More plant descriptions? Do you like more, or less, Note and Comment? In what particular phase of botany are you most interested? What other botanical magazine do you take? Why do you think it better than ours? These and similar questions are what we want answers to. Address these letters to the editor at Joliet, Ill., and send them as soon as convenient. Although this offer does not apply to present subscribers we will add that we shall be glad to consider any suggestions they may make for improving the magazine. The editor has no particular line of botany to which he is committed; his sole interest is in giving the botanical public what it wants.

* * *

In addition to what Dr. Bailey has said in this number about the "deadly upas tree," the editor notes that he has had occasion to spend several pleasant mornings in the shade of what is probably the largest upas tree in the western hemisphere. We noted that the small birds flitted among its branches, lizards played upon its trunk and grass grew in its shade, exactly as they would do with any other tree. Moreover, the authorities had placed a seat close to the trunk and upon this seat we rested while ruminating on the credulity of the general public in botanical matters.

* * *

The editor, who keeps one eye on the subscription list, notices among recent additions an unusual number of teachers of botany, and being himself a teacher of botany, suggests to these teachers that any hints or criticisms that will help make the magazine of greater usefulness to them will be appreciated. It has been his aim to put into the publication such matter as may interest the general public in the plants themselves, believing that when such an interest is aroused the actual work of teaching is greatly diminished. He has not pretended to offer directions for class work, knowing that teachers who read the botanical magazines do not need such directions, but will gladly receive notes or longer contributions that will advance us toward the goal for which we are striving.

BOOKS AND WRITERS.

A volume on the spring flora of Illinois, by Messrs. Kellerman, Schaffner and Gleason, of Ohio University, is announced for early publication.

Nature Notes, the official organ of the British Selborne Society, has decided to broaden its scope, with a view to interesting those outside the society in its work. *Nature Notes* is one of the best of natural history magazines and has no exact counterpart in our part of the world.

Frederick Leroy Sargent, whose articles on "Lichenology for Beginners" appeared in the *Bryologist* last year, has reprinted them in neat pamphlet form for the use of students of these plants. It does not seem very easy for beginners to get hold of this subject, but this pamphlet will be a great help in that direction. There is a very good key and descriptions of the principal species, with considerable general matter, including instructions for collection and study.

A series of "Laboratory Outlines for General Botany" have recently been issued by their author, Prof. John H. Schaffner, of Ohio University. These originally appeared in the *Journal of Applied Microscopy,* but have since been extended and rearranged and are designed to cover a college year in botany. The outlines are similar to those in use, in one form or another, in all schools where the science is taught, and are in most convenient form for the use of pupils. It is to be assumed that the outlines are to be supplemented by lectures by the teacher. The outlines are both varied and complete, but with a somewhat greater leaning toward the verification method than the reviewer favors. There are also directions for staining and mounting specimens, making reagents, etc. The volume is an excellent one to use as the basis of a course in botany, whether in the high school or college.

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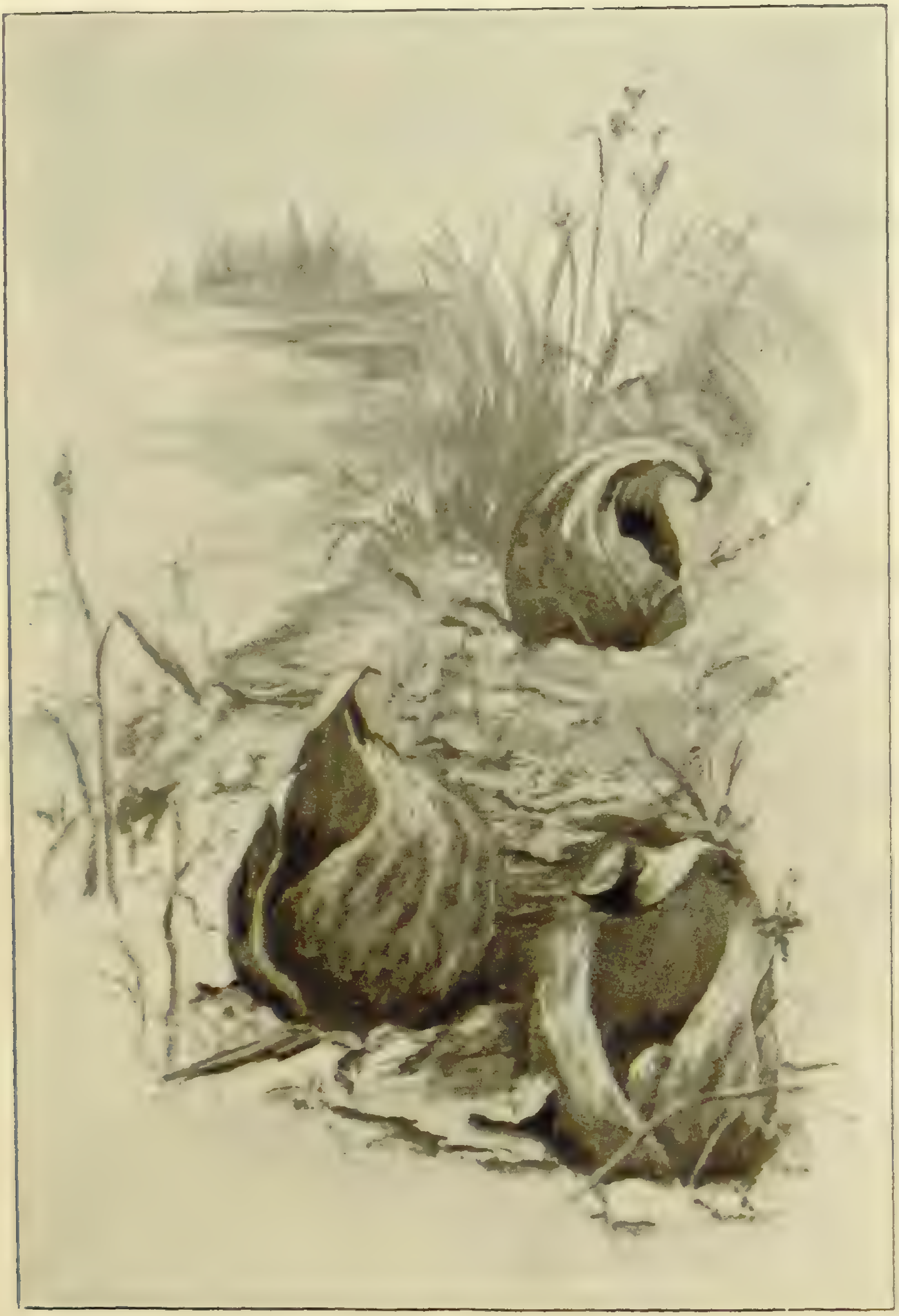

SKUNK'S CABBAGE—Symplocarpus foetidus.

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Vol. X JOLIET, ILL., MARCH, 1906. No. 3

OUR NATIVE ARUMS.

THOSE who take their botany as a recreation, rather than a business, commonly do not care for the nice distinctions that employ the scientist. They shun the grasses and sedges, with their hundreds of species difficult to separate, and look with more favor on the buttercup, heath and lily families, where most of the species are so distinct and clear-cut that after one has identified his plant there comes no disquieting afterthought to suggest that possibly after all it is not the species he thinks it is. Your ordinary flower-lover wants no puzzles among the plants; no species that must be sent to the distant scientist to be verified. As well stay in the house and study geometry as to go afield and study the modern *Crataegus*. It is well indeed to know all the minute differences among the plants—the scientist is entitled to our honor and admiration—but for a botanical holiday we turn to the plants whose bright hues, pleasant fragrances or strange shapes attract attention and make the naming of the specimens easy.

A further attraction attaches to those families that are few enough in numbers to warrant the hope that we may eventually collect them all. There is great satisfaction in completing some department of our knowledge; in writing finis to some special undertaking. No doubt these considerations have something to do with the interest the beginner takes in the Arum family, though the curious shapes of the flowers, unparalleled by other plant families of our acquaintance, may also act as a contributing cause.

In most of the Northern States this family has the honor of furnishing the first spring flower. While yet the maple-buds are unmistakably only buds, and the hazel catkins have shown no signs of relaxing, while pussy willows are still far from showing flowers, this firstling of the year, this leader of the vernal carnival, pushes up its spotted hood by swamp and stream and bids the milder season welcome. Lacking the fragrance of the arbutus or the delicate beauty of the hepatica and dubbed with an offensive name, the skunk's cabbage (*Symplocarpus foetidus*), lays no claim to a favorite's place, but thrives none the less lustily among the greening rushes, giving the first pollen to the bees and the hope of spring to the early rambler. Sometimes, in the latitude of New York, the first flowers appear by the middle of February. These are favored individuals, growing where the living waters of some nearby spring keep the ground unfrozen through the winter, but shortly afterward every swamp is dotted with the pointed spathes. No one can mistake the purple-spotted, shell-like flower-cluster, just peeping above the mud and water. As they commonly grow they appear stemless and un-flowerlike, but if by chance they push up under water they may develop a stem several inches in length, when a decided likeness to their regal relative, the calla lily, is seen. It is generally supposed that the flowers have a strong and fetid odor, but this is incorrect. It is only when leaf or stem is bruised that any odor is noticeable.

Though often found in bloom surrounded by water, the skunk's cabbage usually does not grow in places that are inundated the season through. Its habitat ends near the line of standing water, but just beyond appears an ally, the water arum (*Peltandra undulata*). Its arrow-shaped leaves rise above the water in thick clumps, while below them on long stems the slender, green, pointed spathes enclosing the flower-clusters spread about. No ordinary flower-gatherer considers this so-called flower worthy of a place in a bouquet and one looks in vain in the popular handbooks for a description of it. If the manuals had their way it would be common in most of the states east of the Mississippi, but it appears to be by no means a common plant. As the berries mature this species has the curious habit of bending the spathe downward until the tip reaches the mud, where it decays and probably sets the fruits free. In the South Atlantic States another species, *Peltandra alba,* with a white spathe, is found. Otherwise it is much like its relative.

It is noticeable that all our species of this family show a preference for a watery habitat. Those that are least influenced in this direction are the Jack-in-the-pulpit (*Arisaema triphyllum*) and its relative, the green dragon (*A. dracontium*), but we all know how the first loves a moist, rich spot in the woods, and how inclined the dragon is to haunt the banks of streams. No one needs a description of Jack-in-the-pulpit. The purple-and-green streaked spathe drooping over the erect spadix is familiar to every child who has even a speaking acquaintance with the spring woodlands. As Indian turnip, the underground parts have served as the basis of many a school-boy's practical joke. It is almost worth anybody's while to carefully nibble this pungent corm by way of experiment. It should be tasted, however, not chewed. One may be duly impressed with its powers with a very small amount. Many tropical species have similar properties.

One may well wonder how the green dragon got its name. There is nothing dragon-like in its appearance, though the long, slender, green spadix, too long for the spathe, and therefore projecting some inches beyond it, gives the flower-cluster a bizarre look that must attract the attention if it does not compel the admiration. It needs no further note to distinguish it from the more familiar species, though if this were necessary the single leaf, curiously divided into from five to seven leaflets, would quickly separate it from the trifoliate leaves of Jack-in-the-pulpit.

Although the inflorescences of this family are well known to consist of pistils and stamens seated on a thick stalk or spadix and the whole subtended by a bract or spathe, it is customary to speak of the whole flower-cluster as a single flower. In this sense the flower-clusters of the wild calla (*Calla palustris*) come nearest to deserving the name. The spathes are whitish, flat or spoon-shaped, and are fairly like those of the cultivated calla, which, by the way, is not a *Calla,* though it does belong to the arum family. The leaves also resemble the cultivated plant. The wild calla delights in the more watery parts of open swamps, where it may spread out its spathes to the sun. It is nearly always to be met with in suitable situations and is found in Northern Europe and Asia also.

The sweet flag, or calamus root (*Acorus calamus*), is another product of wild nature which is considered desirable treasure by school-boys, but it may be doubted if in digging it up its relationship to the Indian turnip ever occurs to them, though its warm, aromatic flavor might give them a hint. It is the most un-arum-like of its race, with long, narrow leaves like those of the cat-tail or the blue-flag. Indeed, the common name of sweet flag seems to have been given our species to distinguish it in the popular mind from all other flag-like plants. Its flowers are seldom seen, though they are not rare, because they are colored exactly like the leaves; or, if seen, they are not recognized because so little like flowers. There is no spathe, at least nothing at first glance that looks like one, and the cluster of flowers, like a stiff, green cone, seems to spring from the side of one of the leaves, about midway from base to tip. A closer look, however, convinces us that this leaf-like affair is really a spathe, which is continued beyond the flower-cluster.

After all, a spathe is morphologically a leaf, so why should it not be green and flat upon occasion? The spadix, with its cluster of flowers, is also edible, and has the same pungent flavor as the root, but in lessened degree. The seeds are said to be usually defective, as they often are in plants with other means of multiplying.

Rarest and most curious of all its tribe in our region is the golden club (*Orontium aquaticum*), which delights in sphagnum bogs and the muddy borders of small lakes, where it thrives in several inches of water. It will be recognized at first sight by the slender, club-like spadix, green at the base, white above, and tipped with bright golden yellow. In vain one looks for a real spathe. At the base of the club is a papery sheath that receives the name, but it plays no part in the flower-cluster, as do the spathes of all our other arums. The leaves are spoon-shaped and when growing in water rest upon its surface. The seeds are edible and are said to have been used by the Indians, who boiled them much as we do peas. This fact may account for the peculiar distribution of the plant. It is found usually near the sea coast from Massachusetts to Louisiana, but also occurs irregularly inland. In these latter situations it is often very abundant, and it is conjectured that such places were planted by the Indians with an eye to their food value.

BUDS.

BY DR. WM. WHITMAN BAILEY.

BUDS well illustrate the ignorance of people about common things. Persons who would look surprised and grieved because we confessedly know nothing of the integral calculus and have misty ideas of a great many things not too evidently ethical that occur in business, will yet ask strange questions about objects one would suppose them to have known since childhood.

Almost every year, in January and February, we have a few buds of horse-chestnut, hickory and Norway maple for study and pleasure. The delight may be combined with study, or it may be apart from it entirely; but the study is sure to bring delight, while the joy may lead to further investigation. Often a person of so-called liberal culture will salute us with the remark, "Why, how forward those buds are. A friend of mine saw trailing arbutus in bud the other day. It is going to be an early spring, is it not?"

Now, as a matter of fact, the buds in question and those of elm and a number of other plants, have been in just about the same condition since last August or even earlier. Few people ever look at them. What's the use? They will take care of themselves just as well as if we knew all about them. True, as regards the buds, but it may be our soul's salvation would be safer for a glance.

From a purely practical point of view—and it is the "practical" that is eternally dinned into a botanist's ears—one never knows how soon an observation made in the secret of the closet or laboratory may become of value in the market-place. My own father, studying diatoms and other microscopic organisms for the delight their beauty gave him, was one day called upon by the United States government to investigate the mud from the Atlantic floor to prove whether such a bed was able to bear the telegraph cable. Professor Huxley on the other side and Ehrenberg did the same. These quiet savants suddenly became important. So Louis Pasteur probably little foresaw to what his early researches would lead in the cure of disease or mitigation of human suffering or in the saving of so important an industry as grape growing.

To return from a long digression, buds are young shoots or branches. They may contain foliage or flowers or both, but always they belong to the stem and leaf features of the plant. This, their position, either terminal or axillary, determines; also their structure when dissected. Nothing, by the way, can be prettier than the interior of some buds. Take, for instance, that of the horse-chestnut. Outside it is covered with glutinous scales to turn water which, getting under them if unguarded, might freeze and rend the bud. Right here I am often asked by college students: If this is such an excellent plan, why do not all buds exhibit it? I usually anticipate by saying in a casual way that each plant has its own problems to solve; and what is good for one is not, perhaps, good for another. In briefer form, I own up squarely that I don't know. Good Professor D. C. Eaton, of Yale, told me early in my career as a teacher never to pretend I knew what I didn't. "The student is sure to catch on!" With his words dwelling in my memory I have avoided many sloughs.

After removing the outer sticky scales of our horse-chestnut, we find the subsequent foliar bodies more and more leaf-like, till, finally, we reach the true leaves—seven-fingered, woolly leaves, neatly folded and packed away, Sometimes we will discover in addition the inflorescence resembling a minute cauliflower, which itself is nothing but a mixed bud, never advancing beyond the bud condition. One hates to disrupt these little folded hands. How securely nature has packed them away!

Take, again, beech buds, long, tapering lance-points. The leaves within are things of rare beauty, delicate to evanescence and clothed in the costliest silk. In some buds, horse-chestnut or other, we will find in miniature the whole inflorescence of the year. The microscope reveals, in the tiny buds, what parts of the flower are formed first and the consequent succession of organs. Youth is always interesting, babyhood even fascinating to the roughest of mankind. It is hence with peculiar gentleness that we handle these infantive buds. From them may issue the sinuate leaf of the oak, the lobed or jagged blade of the maple or the little fingers of the horse-chestnut, held out in blessing.

Providence, R. I.

BOTANY FOR BEGINNERS—XXIV.

ORDER 8—LILIALES.

IN tracing the development of the monocotyledons from their simplest forms it is rare that we find flowers with all their parts so clearly distinguished that the ordinary observer can recognize them until we reach the Liliales. There are, to be sure, indications of what is to come, for down in the scale, as may be instanced by the arrowheads among the Naidales, but for the most part the flowers are too little like ordinary flowers to be individually distinguished. Often, indeed, as in the grass family, the flowers are so inconspicuous that they may pass unnoticed, but with the advent of the lilies and their allies we find large, distinct and brightly colored flowers in abundance.

There are nearly five thousand species in the lily alliance arranged in from six to nine families according to the tastes of the botanist who does the arranging. Of these families the bunch-flowers (Melanthaceæ) and blood-worts (Haemodoraceæ) are small and not especially conspicuous. The smilaxes (Smilaceæ) are easily distinguished by their climbing stems and net-veined leaves. The lily-of-the-valley family (Convallariaceæ) was formerly placed among the true lilies, but has been separated from the rest because of its berry-like fruits. The yams (Dioscoreaceæ) are closely related to the amaryllis family, but may be distinguished by their climbing habit and diœcious flowers.

The four chief groups of the lilyworts are the rushes (Juncaceæ), the irids (Iridaceæ), the amaryllids (Amaryllidaceæ) and the lilies proper (Liliaceæ). The ordinary observer would scarcely place the common bulrush and its allies among such regal plants as lilies and irises, but that is certainly where it belongs, as may be easily seen by a glance at the flowers. It is true they are not much like the flowers of lilies in size and color, but in shape and structure they are exact little brownish or greenish lilies. So true is this that certain genera on the border line between rushes and lilies may be placed in either group without offending the proprieties. The iris family may be distinguished by the fact that the flowers have but three stamens and the ovary is below the rest of the flower. In the lilies and amaryllids there are six stamens, but these two families may be easily separated by the fact that in the former the flowers are hypogynous; that is, with the floral parts springing from the base of the ovary, while in the latter the flowers are epigynous, as in the irises. The species of amaryllis are usually called lilies, but if one wishes to distinguish between them a glance at the flower arrangement will settle the matter.

The plan of the flower is, of course, the same throughout the order. It consists of a perianth of two whorls, but with the parts so nearly alike as to appear like one circle, one or two whorls of stamens and a whorl of carpels. The number in each whorl is three. The perianth is usually not to be separated into calyx and corolla upon the basis of color, for the two whorls are commonly colored alike; yet in the trilliums the outer whorl is green and sepal-like, and in most of the others the three outer perianth segments are slightly larger or coarser, as if foreshadowing the typ-

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ical flowers of Dicotyledons. In many species we may still find traces of the bract that enfolds the flowers of the lower Monocotyledon orders, as in the Amaryllids, where the flower buds are often enclosed in such a bract. In the Japanese species of *Rhodca* the small flowers are borne on a spadix not unlike that of some Arums. Mention should be made, also, of the peculiar outgrowths from the perianth of various Amaryllids, as in the narcissus and jonquil, where it forms a cup.

In general, the flowers of this order are large, and by their color, nectar and perfume indicate that they are pollinated by insects. Nectar is secreted at the base of the ovary or in special grooves lengthwise of the perianth segments. In the majority the flowers are regular and the nectar accessible to a variety of insects, but in the iris family and many of the Amaryllids the flowers are zygomorphic and adapted to certain insects only. In connection with one of the Amaryllids, a most remarkable case of symbiosis with an insect has sprung up, in which a moth (*Pronuba*) lays its eggs in the seed capsule of the yucca, and then to insure that the young seeds will develop and form food for its larvæ, deliberately gathers the pollen and places it on the stigmas. Only a few of the seeds form food for the larvæ, the rest maturing. It is said that in regions from which this moth is absent the yucca does not mature its seeds. The irises, also, show great specialization for cross-pollination, and by an arrangement of stigma, style and sepal, manage to secure the attention of insects in just the right way to effect these ends. On the other hand, the rushes are practically all wind pollinated and are therefore actinomorphic, small and dull in color. Among the lilyworts we find a large number of delightful perfumes, but there are other members of the order, for example, the carrion flower (*Smilax*) and some of the trilliums, whose odors can be described only as stenches. These odors attract flies, and the flowers are thus as effectively pollinated as any.

There are many things about the vegetative parts of this group that are of interest. For the most part, the leaves are long and narrow (linear), but many broad-leaved forms are known. Although this is a typical Monocotyledon family, some of the broad-leaved forms are net-veined, as in the yams and smilaxes. The great majority are herbaceous perennials, but a few like *Dracaena* and *Yucca* are shrubby or tree-like. The herbaceous species are mostly geophilous with the intermittent life-habit; that is, the main stem is underground in the form of a corm, bulb or rootstock. Into these underground parts the plants seem to retreat whenever danger above ground threatens. In our own region the danger is usually from cold, but in other parts of the world it may be extreme heat or drouth. In these underground parts a considerable food supply is stored, allowing a rapid development of the parts above ground when a favorable season returns. Man has taken advantage of the plants' providence, and regularly uses the food store of some species, as the yams and onion. Saffron comes from one of the iris family, asparagus, aloes and squills from the lily family. Sarsaparilla is obtained from one of the smilax family. The Liliales, however, are valued more for the beauty of their flowers than for their edible qualities.

The fruits of this order are either dry capsules or berries. The species with capsules have no very specialized methods of seed distribution, and the species seldom extend over very wide territory. Those with berry-like fruits, adapted to dispersal by animals, have a much wider distribution. The order, however, is represented nearly throughout the world, being very common in regions where xerophytic conditions prevail.

GRAPE FRUIT AND SHADDOCKS.

THERE is little doubt that much confusion exists as to what is really grape fruit, as distinct from the allied citrus fruits passing under such names as pumelow (invariably spelled pomelo in the United States), shaddock, forbidden fruit, paradise fruit, and others. These fruits are all, or nearly all, larger than the largest orange, and they are uniformly of a pale-yellow color. In texture the rind may be smooth or even polished. It is seldom rough, nearly always firm and not very thick. The pulp is pale-yellow or greenish-white, sometimes pink or crimson. The juice bags of the pulp are more distinct than in the orange and very juicy, somewhat sweetish, with a distinct but agreeable bitter flavor. In shape these fruits vary a good deal. Some are quite globular, others somewhat flattened at the top and tapering below, forming a pear-shaped body.

These fruits have been ranged under the giant citrus (*Citrus decumana*). This is supposed to be a native of the islands of the Pacific. It was introduced into the West Indies from China about 150 years ago by Captain Shaddock, in compliment to whom, since that time, the fruit has always been known in this part of the world as shaddock. The term shaddock may be correctly applied to any of the larger members of the giant citrus. The word pumelow, so widely used in India and Ceylon, is supposed to be a contraction of *pomum melo,* the melon apple.

All the larger-fruited sorts may, then, be called either shaddocks or pumelows; these are merely the Western and Eastern names for the same thing and are perfectly interchangeable. There are two well-marked varieties, one being globose, with the flesh of a pale-pink color, and the other pear-shaped, usually with a deep-pink or crimson pulp.

As regards the small-fruited sorts, these, according to Dr. James Macfadyen, the author of the "Flora of

Jamaica," may be either globose, when they are called forbidden fruit, or pear-shaped, when grape fruit (so-called because the fruits grow in clusters like a bunch of grapes) is the older name. The name forbidden fruit (from a fancied connection with the Garden of Eden) is tolerably old in the West Indies.

As usually happens, when a name has become familiar in commerce, it is eventually applied in a much wider sense than the original one. Thus, the term grape fruit has become so general that any moderately large fruit, provided the skin is pale-yellow, thin and smooth, and the pulp of a delicate flavor, is designated by it. The fruit commonly called grape fruit in New York is really the forbidden fruit of the West Indies. The true grape fruit is pear-shaped, and, according to Macfadyen, when obtainable at its best, is preferable to the forbidden fruit. The latter are in great demand, and they are regarded as the most refreshing and wholesome of any of the citrus family.

The grape fruit is not a shaddock nor a pumelow. It is quite a distinct fruit and possesses exceptional merits. It is in great demand in America, chiefly because it has been so highly recommended by the medical faculty for its valuable dietic and tonic qualities. It is also very refreshing and is regarded as a specific for dyspepsia.

There are, doubtless, many inferior sorts of grape fruit. In fact, in the West Indies, the plants have been allowed to run almost wild. No care has been taken to select the best varieties, or to bud or graft them so as to keep them uniformly at a high standard. There is no need to grow the thick-skinned and bitter sorts and those with a dry, cottony pulp, while there are varieties, both of the apple-shaped and pear-shaped fruits, with a silky skin, full of juice and of almost delightful flavor and with just enough bitter to give it piquancy and suggest its valuable tonic qualities.—*Indian Planting and Gardening.*

YERBA MATE OR PARAGUAY TEA.

THE plant from which yerba mate is produced is a species of holly, *Ilex Paraguayensis.* Last year not less than 35,000 tons were exported from Brazil and Paraguay alone. The common name of the beverage is Paraguay tea, although the use of the word tea is obviously incorrect.

The principal varieties of yerba are grown in Argentina, Paraguay and Brazil. The Paraguayan plant is the strongest, has the richest flavor, and commands the highest price. Next in quality is the Argentina yerba, grown only in the province of Las Misiones. It is steadily improving in quality, but the output is small and falls far short of supplying the demand. The yerba grown in Las Misiones is of three varieties: Yerba morada, with violet-tinted, dark-green, oval leaves, six to eight inches long and three to five inches broad, produces a very bitter and inferior quality; yerba blanca, conspicuous for its whitish dark-green leaf about half as large as that of the morada; and yerba caa-mi or amarilla, with a leaf of slightly yellowish color, and one and a half to two and a half inches long. This supplies the best of the native yerbas, although it is surpassed in quality by some varieties of the Paraguavan and Brazilian plantations. Brazilian mate, the cheapest of all, is produced in the greatest quantity, but is not so rich in flavor as any of the others.

Yerba mate is a mild stimulant and is also highly nutritious. In some parts of South America it constitutes nearly the whole sustenance of field laborers, who often drink ten and twelve cups daily. It has none of the bad effects of alcoholic liquors, and its use is therefore being strongly encouraged from the humanitarian and sanitary standpoint. It is also much more easily prepared for market than coffee, the whole operation not lasting more than thirty-six hours.

The full-grown yerba plant is usually about the size of an orange tree, though it sometimes grows as high as twenty feet, with a trunk measuring over three feet in circumference. Its leaves are described as perennial, rather thick and coriaceous, with strong mid-ribs. The trunk and branches have a somewhat velvety appearance, due to a fine, fuzzy growth on the bark. The flowers are small, white and four-parted. The fruit is red, about the size of a grain of pepper, and contains four very hard-coated seeds.

The harvesting of yerba includes gathering both leaves and twigs. The first crop is taken when the plants are four or five years old, care being had not to remove more than one-fifth or one-fourth of the leaves from each tree. At six or seven years of age the crop from each plant should average sixty to eighty pounds, including uncured leaves and twigs. Even good-sized branches are often harvested, as the crop can thus be much more quickly gathered than if only the leaves are picked, although the woody parts inpair the quality of the beverage, and, indeed, the best kind is made from selected leaves only. Yerba of this grade, however, is not found in the general market, as its cost is several times greater than when twigs and small branches are included in the gathering.

The beverage is given one of four names—"mate amargo," having a bitter taste; "mate dulce," sweetened mate; "con leche," when prepared with milk, and "cocoa mate," if mixed with cocoanut.—*From an Article in Tea and Coffee Trade Journal.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

TROPICAL TREES.—"In an ordinary temperate forest," writes Dr. Francis Ramaley in *Popular Science Monthly,* "the number of species of trees can almost be counted on the fingers of two hands. The species in a Northern coniferous forest might be counted on the fingers of a single hand. In a West Java forest there may easily be fifty species of trees within a distance of as many feet from an observer. In the whole island of Java there are probably a thousand different kinds of arborescent plants—perhaps more."

SPHAGNUM AND LIME.—The peat moss (*Sphagnum*) is so abundant in many parts of the world that it fills immense bogs, and its dead stems, mingled with other vegetable debris, form layers of peat many feet in thickness. In other parts of the world, however, the peat mosses are unaccountably absent, and it has been conjectured by botanists that their absence is due to large amounts of lime or other mineral salts in the water. This has been tested by E. N. Transeau, who finds that peat mosses, contrary to the general impression, are not prevented from growing by such mineral salts.

THE WATER-CRESS GENUS.—There are people who think that the water-cresses are still to be found in the genus *Nasturtium*, but for some years they have been masquerading under the name *Roripa*. This latter name was given to the plants in 1760 and quite forgotten until a botanist dug it up out of the limbo of antiquity about one hundred and forty years later. A few followed this leader and called the plants *Roripa*, but they had their trouble for nothing. Another botanist has now found a name given four years earlier and the world is asked to call the plants *Radicula*. Why not call the whole proceedings *Ridiculous* and be done with it?

SEED DISPERSED IN THE CONIFERS.—There are two misconceptions prevalent about the conifers. The first is, that all plants belonging to this group are evergreen, and the second, that all bear cones. The larch or tamarack (*Larix Americana*) is a good example of one of these "evergreen" trees that is not evergreen, and the cypress (*Taxodium distichum*) is another. The behavior of this latter tree is the more surprising, since it is an inhabitant of the South and apparently not obliged to cast its leaves in autumn, as are the broad-leaved trees farther north. Not content with dropping all its leaves, it often drops some of its young twigs as well. All the trees belonging to the group are cone-bearers, at least by courtesy, though the fruits of some are as little like cones as they could be. That of the yew appears like a fleshy red drupe and the berries of the juniper are well known. In these cases the fruit is modified for distribution by birds or other animals. In the trees that bear cones of the familiar form, the seeds have a wing-like expansion of the seed-coat that aids their distribution by wind. The erratic cypress has still another method. Its cones are small, spherical, composed of very few scales, and fall to pieces at maturity. The seeds are surrounded by a thick, cork-like layer, which is apparently designed as a float for distribution by water, and the early breaking up of the cone thus facilitates the process. Since the cypress grows in marshy places or in standing water, this adaptation for distributing the seed is a most successful one.

Editorial.

Those who find this magazine helpful in its present form will no doubt be interested in the result of the invitation that was extended to critics in the February number. A good share of those to whom the marked copy was sent replied, and from these letters we feel that we have now gained a glimpse of the magazine from the point-of-view of the non-subscribing applicant, at least, that will be most helpful to us in planning future issues. The letter which, all things considered, we regard as the best, was written by Frank R. Miller, R. D. 3, Toledo, Ohio, and the second best was sent by D. A. Bright, Larned, Kas. To both of these gentlemen the magazine will be sent free for 1906. Mr. Miller also has the privilege, if he chooses, of obtaining all the back numbers for $2.00, and Mr. Bright has a like privilege at the $3.00 rate. To all other critics a copy of the present number will be sent.

* * *

One of the greatest surprises we received was the statement in almost every letter that the magazine is too technical! One of these critics, at least, is a graduate of a well-known university, but it is possibly needless to say he was not in the scientific department. All this time we have been flattering ourselves that this is the most untechnical magazine that ever happened, and now the public rises up and asks us to be more intelligible! We fail to see yet how we can become more so without dropping into words of one syllable. It begins to look as if botanical literature, even of the popular sort, has a dialect all its own which is but jargon to ears unaccustomed to it. Those who read and *do* understand may begin to realize the select company they are in.

Nearly all our critics, also, asked for assistance in breaking into the charmed circle about the goddess Flora. "Give us," say they, "more articles by which we may discover the names of the attractive flowers in our own woods and fields." To this we might reply that the magazine was started principally with a view to providing information for those who have passed the identification stage in botanical work, but there seems to be so great a demand for articles about the showy wild-flowers that hereafter we plan to have at least one article of this kind in each issue. It may be remarked in passing, also, that the series of articles on "Botany for Beginners," if read thoughtfully in order *from the beginning*, should place the reader in a position to understand at least the major part of what now appears in the publication.

* * *

After all, who is there among us that understands all he reads on even his own line of research? I do not question the mere understanding of the words, but that deeper understanding that takes and makes each idea or fact its own. One may read volume upon volume of descriptions of a plant, and see pictures in plenty, yet when he finds it, it does not fit the mental image previously formed. Nor does the mind readily take up unrelated facts. We must first have a peg to hang our information upon. As we advance in knowledge, facts that we have read and forgotten take on new meanings and become alive. Thus a second reading of a book or a glance through the old numbers of a magazine brings out beauties that we never realized were there.

* * *

Those who expressed any opinion on the subject, favored more note and comment at the expense of the longer articles. We hope our readers will all make note of it! There is probably not a week goes by in which every plant student does not find something worth writing about; something which he would be sure to mention if we could go herborizing with him. A short note on the subject would add much of interest to our department, we are sure.

* * *

The November number of this magazine has been printed for at least six weeks, but has not been sent to subscribers for the very good reason that the postal authorities are still trying to make up their minds where the issue can be mailed. Our change in the mailing office seems to have completely upset their calculations. As soon as we receive a decision subscribers will receive their copies. Meanwhile the December number is in type and the printing and binding will not delay it much longer. It will doubtless be out in time to be mailed with the other number.

* * *

Our London contemporary, *Gardening World,* has issued free to its subscribers their "Handbook No. 1," which describes the fifty best roses for British growers. The handbook is written by the editor, John Fraser, F. L. S., F. R. H. S., and besides describing the plants gives full cultural directions and illustrates a large number of them. We are also indebted to this enterprising publication for a copy of their excellent pocket diary for 1906, which, in addition to giving ample room for daily memoranda, contains considerable other information of value to the gardener.

The Great Lakes Botanical Club has been founded by A. B. Klugh and a number of other botanists, for the study of botanical problems related to the region of the Great Lakes. At present the work will be carried on by a circulating bulletin to which all the members will contribute.

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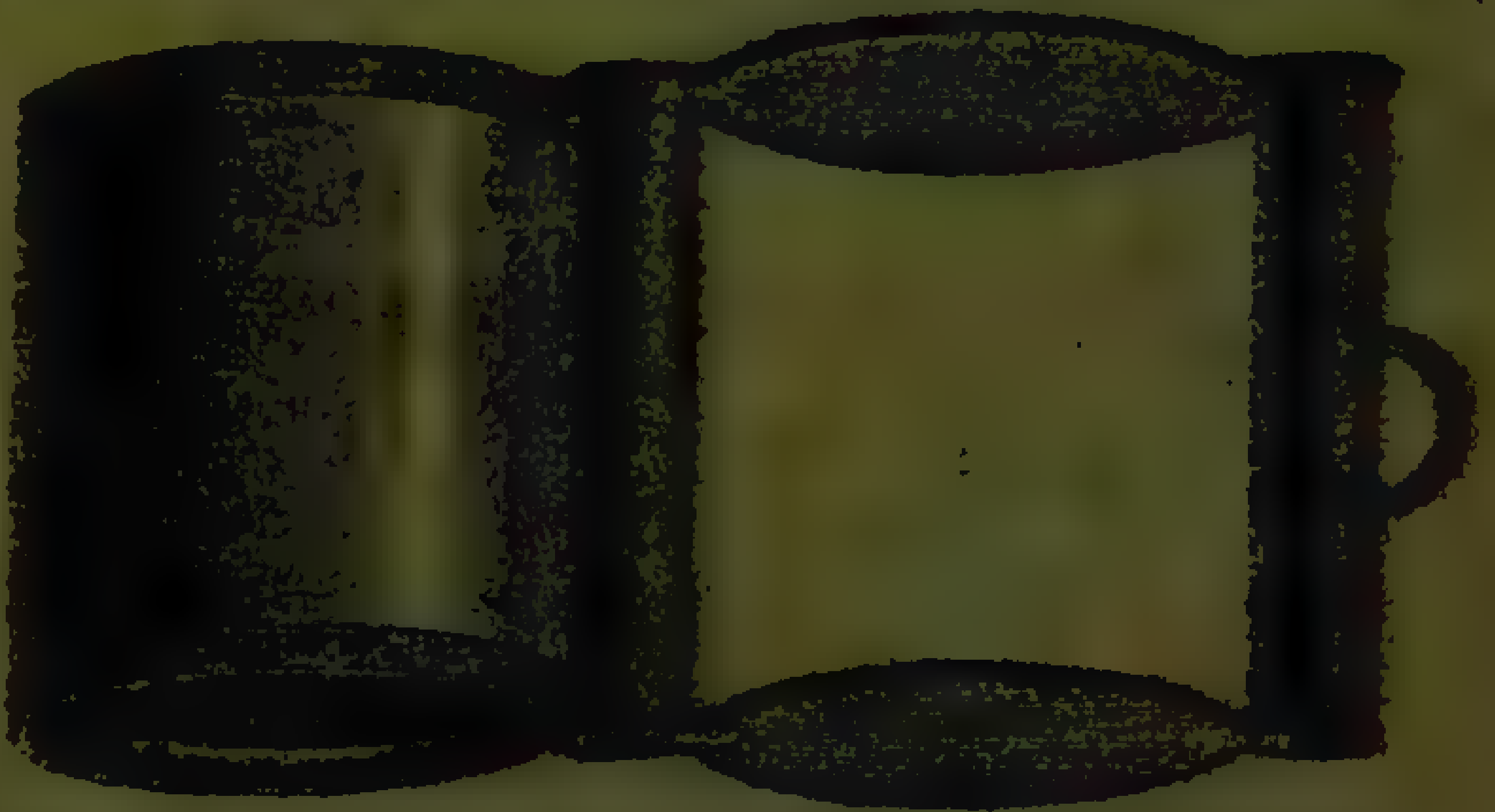

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THE AMERICAN BOTANIST.

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ISSUED ON THE 15th OF EACH MONTH

WILLARD N. CLUTE - - - - - - EDITOR

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CATKINS OF WILLOW, ASPEN AND HAZEL.

THE AMERICAN BOTANIST

VOL. X JOLIET, ILL., APRIL, 1906. No. 4

OUR AMENTACEOUS PLANTS.

THE amentaceous plants form a large part of our spring flora, though in but few instances can it be called a conspicuous one. With the exception of a few plants like the pussy-willow and the alder, the flowering parts are so little like ordinary blossoms that the casual observer rarely notices that they are in flower, and the botanist, himself, is usually not so familiar with them as he is with the more conspicuous members of our flora. Many people have an idea that several of these plants in some unexplained manner, bear fruit without the preliminary process or flowering. The average man is always surprised to learn that oaks bear flowers.

There are several reasons why these plants attract no more attention than they do when in flower, In the first place they have no showy petals or sepals to catch the eye, and the essential organs, the pistils and stamens, are usually greenish or pale yellow like the opening leaves. When these organs take on bright hues, as they do in the chestnut, willow and cottonwood, they at once become noticeable. Again, the size of the individual flower makes them very inconspicuous. It is only by being assembled in spike-like groups, called catkins, that they attract any attention at all. The catkin may be said to be the badge of the order. It varies with the species, but in all it is essentially a slender axis along which many flowers are clustered. These flowers are rarely composed of both pistils and stamens; usually the pistils are in one group and the stamens in another. Sometimes, as in the hazel, the two kinds of flowers are on different parts of the same plant; again, as in the willow, the two kinds are on separate plants; and in others, like the chestnut, the pistillate flowers are clustered at the base of the staminate ament. The pistillate flowers in nearly all our species exhibit a tendency to be grouped in very short, few-flowered spikes. The staminate flowers are the ones that usually form the real catkins. If one will examine a single scale from one of these catkins he will find that it bears several stamens on the upper surface. The number and arrangement varies with the species, but in all, the stamens greatly outnumber the pistils and a great amount of pollen is produced. This abundant pollen is necessary to ensure pollination, since the wind is depended upon as a carrier. For the same reason most of the species bloom early in the year, before the leaves have appeared to prevent free circulation of the pollen-laden air.

The amentaceous trees are not abundant in the tropics, but the bulk of our arborescent flora is made up from this group. Among the plants that belong to it are the oaks, willows, birches, poplars, alders, hazels, hickories, walnuts, ironwoods, chestnuts, beeches, bay-berries and sweet-fern. The various groups may be distinguished by their blossoms, but other characters are often necessary for the identification of the individual species; in fact, the willows are among the most difficult of plants to name satisfactorily. The oaks and various others are best identified from their fruits, but most of them can also be recognized by their leaves and bark alone.

OUR VIBURNUMS.

BY DR. WM. WHITMAN BAILEY.

THE other day I was much surprised to receive from a lady in Foster some very fine specimens of *Viburnum lantanoides*. I had never seen it before from our own state, although I had known of it as being found near Wallum Pond.

This plant, variously known as hobble-bush and wayfarer's bush, is the most beautiful, on the whole, of its very lovely genus. It resembles a glorified *Hydrangea*. The broad cymes of small white, creamy flowers are surrounded by a circle of large, pure white neutral flowers. It will be remembered that *Viburnum Opulus*, from which is derived the snow-ball of our gardens, is, in its original state, the same. By cultivation the whole cluster is changed into abortive flowers, devoid of essential organs. Both species are more beautiful before such change occurs.

A great charm of the hobble-bush, apart from the exquisite old lace of its flowers, is its foliage. The generous heart-shaped leaves are rusty with a sort of tomentum, which, covering the fresh green of the blades, adds very much to their beauty. They are rugose-veiny and emerge from naked buds—things of infrequent occurrence in our inclement regions; indeed, we are so used to scale-protected buds that we are surprised when we find any other.

Howitt, in his "Book of the Seasons," thus addresses our shrub:

"Wayfarer's tree! what ancient claim
Hast thou to that right pleasant name?

* * * *

Whate'er it be, I love it well;
A name, methinks which surely fell
From poet, in some evening dell,
Wandering with Fancies sweet."

The bush or small tree may rarely rise to a height of twenty feet, but where we have seen it most abundantly, in New Hampshire, in New Brunswick, or about Mount Wachusett, it was not nearly so tall.

Viburnum Opulus, also native, has the common name of high cranberry, but is not related to the true cranberries of the Heath family and genus *Vaccinium.* I cannot remember to have seen this wild in Rhode Island. The berries of both these species are bright red and handsome, those of *Viburnum Opulus* having a peculiar translucent brilliance.

Other species of *Viburnum* in our state are the maple-leaved, known as dockmackie and arrow-wood, which has blue or dark-purple berries; the *Viburnum dentatum,* with sharp-toothed ovate leaves and almost metallic blue berries; and the sweet viburnum or sheep-berry, a tree from fifteen to thirty feet high and with edible fruit.

These shrubs are very apt to be confused by the ordinary observer with some of the cornuses or dogwoods, also known as cornels. The entire, and peculiarly veined leaves of these, however, at once put one on guard. Among them occur our glorious flowering dogwood—and its pretty little dwarf imitator, the bunch-berry. These are not of the poisonous dogwoods, which are sumacs, with compound leaves and dirty-gray berries.

The cornels always impress upon the writer the mistake we commit in so often going far afield for ornamental shrubs when they grow, as it were, at our own doors. Think of the azaleas, rhododendrons, laurels, andromedas, not to speak of many others.

Brown University, Providence, R. I.

New Use for Hops.—The time-honored use of hops for brewing may in this temperance age ultimately give way to other uses. In the Old World the young and tender tips are boiled and used as a garnish for meats. They are reported to have a delicious nutty flavor. Further experiments will doubtless be necessary before hop growers turn from brewing to boiling.

BOTANY FOR BEGINNERS—XXV.

ORDER 9—SCITAMINALES.

IT may be doubted whether the average lover of flowers is aware that an entire order intervenes between the lilies and orchids, but such is the case. This order has no representatives among our Northern flowers and is usually passed over in our text-books with little or no mention. In the tropics, however, it is of great importance, as may be surmised when it is known that the banana, ginger and arrowroot belong to it. The order shows very plainly its advance over the Liliales, in its zygomorphic flowers, and underground rootstocks and foreshadows the flower-structure in the Orchidales by the reduction in the number of stamens and the differentiation of the perianth into calyx and corolla.

Practically all the plants of this order are perennial herbs patterned very much after the form of our common Solomon's seal. There is a thick knotted underground rootstock from which aerial branches rise. These aerial branches are usually short and bear numerous broad leaves, which are often arranged in two rows, necessitating the placing of one leaf directly above another on each side of the stem. The inflorescence is terminal and consists of numerous flowers, subtending which large spathe-like bracts are noticeable. An excellent example of such bracts may be found upon the banana plants in almost any large greenhouse: for the type of a slightly different flower arrangement one may investigate the canna.

The flowers are all zygomorphic and usually highly colored. There are two whorls in the perianth and in most cases the sepal whorl and the petal whorl are distinguished by different colors. Normally there should be six stamens, but this number is rarely found. In the banana family there are often five fertile stamens, but in the other families of the order it is common for only one stamen to be fertile, and in the canna and arrow-root families the reduction is still greater, there being but half a stamen functional. The original six stamens, however, are not entirely missing in most cases, but are turned into petal-like organs called staminodes that aid materially in guiding insects to the nectar and pollen.

The color of the flowers and the nectar seem to indicate the fact that the plants are not pollinated by the wind. It is equally certain from the size of the flowers in many species that they are not pollinated by insects. This, in fact, is one of the few orders that make use of birds as pollen carriers. Our own cannas are frequently visited by humming-birds as well as bees, and in the East Indies certain birds called honey-birds, from their fondness for nectar, assist in the transference of pollen. It is probable, however, that a majority of the species are pollinated by insects. The nectar is secreted in great quantities deep in the tube of the flowers. The fruit is either a capsule or berry. The canna fruit is a good example of the capsule, while the common banana is an example of the "berries" that this group produces. To call this a berry seems stretching the definition a trifle.

Four families make up the order Scitaminales; the banana family (Musaceæ), the ginger family (Zingiberaceæ) the canna family (Cannaceæ) and the arrow-root family (Marantaceæ). Of these families the ginger family is the largest, containing more than three hundred species.. In this family is found the ginger-plant (*Zingiber officinale*) from whose rootstocks the well-known Jamaica ginger is made. The tumeric (*Curcuma longa*) and cardamom (*Elettaria cardamomum*) are also members of this family. The seeds of other genera besides *Ellettaria* are called cardamoms. Our common cultivated canna (*Canna*

Indica) is the only familiar member of the canna family. This is the smallest family in the group with less that forty species. The rootstocks of several species yield starch. The starch-producing family, par excellence, is the Marantaceæ. *Maranta arundinacea* is the plant from which the arrow-root of commerce is obtained and the rootstocks of numerous other species may be used. There are nearly three hundred species of Marantaceæ in the tropics. In addition to our familiar banana (*Musa paradisiaca*) the Musaceæ includes the Manila hemp (*Musa textilis*) itself a banana, and the famous traveler's tree (*Ravenala Madagascariensis*). The banana family is not large, there being about eighty species included in it. Several species are grown for ornament and may be found in nearly any large collection of plants.

A FERN COMMUNITY.

BY FRANK DOBBIN.

SOME time ago I had opportunity to visit several times during the months of September and October a bit of the "forest primeval." It was only a bit to be sure, consisting of a tract of four or five acres on the premises of a wealthy farmer. Here the axe had spared a few noble old giants—elms, beeches and maples—which looked as if they might have been respectable trees before the Declaration of Independence was signed. Through the center of this bit of forest wandered a tiny brook, little more than a rivulet in fact. The moist, rich soil and the kindly shade made it an ideal spot for certain ferns, and right gladly did they take advantage of it.

All of the osmundas were present, the royal fern (*Osmunda regalis*) growing beside the brook, while over the fence in an adjoining meadow were both the cinnamon fern (*O. cinnamomea*) and the interrupted fern (*O. Claytoniana*). The sensitive fern (*Onoclea sensibilis*) was present, as it nearly always is in such situations, as well as the ostrich fern (*O. Struthiopteris*), which lifted its tall fronds out of the black soil.

Here for the first time I made the acquaintance of the beautiful bladder fern (*Cystopteris bulbifera*), its long lanceolate fronds, usually bearing the little bulblets, hanging out over the brook in many places. Its near relative, the fragile bladder fern (*C. fragilis*),was also present, but its small fronds were nearly hidden by its larger neighbors.

Back a little way from the brook stood a clump of the silvery spleenwort (*Asplenium thelypteroides*), while by the fence at the edge of the wood lot were numerous patches of the lady fern (*Asplenium Filixfoemina*). Near the silvery spleenwort were a few individuals of *Nephrodium cristatum* var *Clintonianum*. Both the silvery spleenwort and the Clinton's fern were new to me at that time and it can be imagined with what eagerness I began a search of the manual for their names. Back in the deeper shade grew the Christmas fern (*Polystichum acrostichoides*) as well as *Nephrodium spinulosum* var. *intermedium* and of course the common *N. marginale*. Sometime later I found in a near-by wood, by the margin of a lake, a fern which proved to be *N. Boottii*. Perhaps a closer search might have proved that Boott's fern was also a member of the community. On the dryer knolls grew the New York fern *N. Noveboracense*) and in the boggy ground by the brook the marsh shield fern (*N. thelypteris*.)

The most abundant of all, however, was Dickson's fern (*Dicksonia pilosiuscula*). It was scattered in dense mats through the more open and sunny parts of the wood. At this season of the year, September, its fronds were looking decidedly blase and hardly a perfect one could be found.

The little oak fern (*Phegopteris Dryopteris*) grew in the shade of some hemlocks, but was not at all abundant.

I also found *Botrychium tunatum obliqum*, or one of its numerous varieties, thus making a total of eighteen for this comparatively limited area. There were no rocks, and thus there was no opportunity to search for the rock-loving ferns. Considering this fact, I think the community rather a large one.

Shushan, N. Y.

A NEW BLACKBERRY FROM VERMONT.

BY W. H. BLANCHARD.

THIS is a dwarfish blackberry which belongs to no class yet described. The plants are dwarfish, erect, 5-foliate, yellowish with long, pubescent, glandular often branched racemes. From its yellowish color and dwarfish habit, it may be named.

RUBUS FLAVINANUS N. SP.

New Canes.—Stems erect, 1½ to 3 feet high, yellowish, glabrous and nearly glandless, 5-angled and furrowed. Prickles rather slender, but strong, mostly hooked, situated generally on the angles. Leaves large in proportion to the size of the plant, very thin, 5-foliate, yellow-green and nearly glabrous on the upper surface, whiter, pubescent and velvety on the lower surface. Leaflets narrowly oval, long-pointed, cuneate at the base, coarsely and doubly serrate-dentate, outline entire, the middle leaflet widest. Petiole and petiolules grooved, slender, yellowish; prickles hooked, slightly glanded and pubescent; the petiolule of the middle leaflet ¾ inch long, the basal leaflets sessile.

Old Canes.—Erect, prickles somewhat impaired, stem slightly reddish, second year's growth, consisting of long racemes, more or less leafy at the base. Axis nearly straight, sometimes slightly zig-zag at the base, angled, woolly pubescent with many glanded hairs. Leaves mostly 3-foliate, some unifoliate, thin, very coarsely serrate-dentate, the color and pubescence like those on old canes. Leaflets narrow, long-pointed, narrow wedge-shaped at the base. Raceme proper very long, resembling *R. nigrobaccus* Bailey, comprising most of the branch near the top of the plant, but less on the lower branches. Pedicels slender, woolly and glandular, set at a moderate angle to the axis and subtended by rather long and slender bracts. Flowers over an inch broad; petals narrow, less than half as wide as long; sepals conspicuously long and narrow, pubescent and glanded. Fruit maturing but very few drupelets, more often none. In flower late in June; fruit ripe the middle of August.

Type station in the yard and land adjoining the church in Stratton, Windham County, Vt. Dry, open ground. Altitude, 1,800 feet. This peculiar species was first noticed by me June 25, 1904, and was closely watched during the remainder of the season. The racemes and glandular pubescence reminds one of *R. nigrobaccus*, which is rare at this altitude, but in most respects it has no resemblance to that species. I have several anomalous dwarf forms that may be grouped around this.

Westminster, Vt.

SOURCE OF LACQUER.—It is said that the Japanese lacquer comes from a tree closely related to our own poison sumac (*Rhus venenata*) and that experiments have shown that our plant yields a very similar product. All that is needed to make good lacquer is some method of avoiding the poisonous exudations of the plant. There are few instances in nature where a really desirable product is so well protected as to puzzle man in his efforts to obtain it.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

THE USES OF BARK.—We are so accustomed to seeing thick and rugged bark on all old trees that we usually think it the natural result of age. According to Dr. Francis Ramaley, however, the trees in warm, moist regions, where they do not need to be protected from cold or from drying out, have smooth trunks, even in old trees. Some approach to differences of this kind may be seen in our own trees. Those with rough bark are usually found in the dryest and most wind-swept positions.

EDIBLE FERNS.—The young fronds of various species of ferns are occasionally used as pot-herbs in America, but we must go to the other side of the world to find such things among the regular articles of commerce. Tons of bracken (*Pteris aquilina*) and royal fern (*Osmunda regalis*) are used annually by the Japanese. The young bracken fronds are cut off before they have unfurled, soaked in wood ashes and water for a few days to get rid of the bitter taste and are then boiled like asparagus. The royal fern is collected just as the fronds are developing, and after boiling are pressed and dried for use as occasion requires.

SWAMP-PLANT PARTNERSHIPS.—All normal plants appear to be endowed with tiny one-celled root hairs near the tip of each root, by which plant food is absorbed from the soil, but various plants have set up partnerships with certain fungi whereby the fungi, inhabiting the outer layers of the root, secure the necessary moisture and thus obviate the necessity for root hairs. E. N. Transeau reports in the January *Botanical Gazette* that in studying certain bogs in the Huron River valley he found a long list of plants with mycorhiza, as this root-fungus is called, among which may be mentioned the larch (*Larix Americana*), white pine (*Pinus strobus*), the black spruce (*Picea Mariana*), yellow birch (*Betula lenta*), dwarf birch (*B. pumila*), the cranberries (*Vaccinium oxyoccus*) and *V. Macroccarpon*), the running birch (*Chiogenes hispidula*), the blue berry (*Vaccinum corymbosum*) and Greenland tea (*Ledum latifolium*). Experiments seem to indicate that these mycorhiza develop only when there is not sufficient air in the soil.

YAMS.—In the United States there is considerable haziness as to the definition of the word yam. By many the common sweet potato of the South is so called, but this is a mistake. There are no yams grown in this country, unless a few specimens may be cultivated in Florida. It would be incorrect, however, to say that no yam species grow in the United States, for one *Dioscorea villosa* is found as far north as Canada. This is not considered an edible plant. The edible species most cultivated in the American tropics apparently belong to the species named *D. alta, D. cayennensis, D. sativa* and *D. trifida*. In Jamaica nearly twenty named varieties are cultivated that may be referred to one or another of these four species. The part eaten is the underground rootstock which in some forms reaches a length of four feet and a diameter of eighteen inches. One does not ordinarily go to market for yams, or even for a yam, but for a piece of yam. There is great difference in the flesh of the different varieties of yams, some being soft and white, while others are coarser and yellowish in color. All the plants bear a general resemblance to our common wild species.

ORIGIN OF THE TERM CONSERVATORY.—In the modern use of the word conservatory, we usually mean a glass house for growing flowers, but originally the conservatory was a glass house, usually attached to the dwelling, where flowering plants were kept only while in flower. They were brought to flowering in the greenhouse in some other part of the grounds and were returned there when their period of bloom was done.

A NEW STATION FOR SCHIZAEA.—One of the most interesting of the North American fernworts is the little curly grass (*Schizaea pusilla*). For a long time it was supposed to grow in New Jersey only. It has since been found in Nova Scotia and in Newfoundland, and in the October number of the *Fern Bulletin* is a report of its recent discovery in Cape Breton. There are many who think that this curious little fern will be found at other points between these extremes.

WESTERN MULLEINS.—We folks from "the East" always first think of *Verbascum thapsus* when mullein is mentioned. Though I have not seen this old familiar species in Southern California, it would not surprise me to meet it any summer day. I have often seen *V. virgatum* hereabouts. I saw *V. thapsus* in Northern California and in Oregon in 1904. At Glendale, Ore., I saw a single plant of *V. blattaria.* So on "the coast" I have seen only the three species that I have ever seen anywhere. That white mullein (*V. Lychnitis*), mentioned by the books as rare, I have never seen.—*W. W. Munson, Pasadena, Cal.*

BEES AND THE ODORS OF FLOWERS.—When the first crocuses opened in the editor's grounds this spring there were no other flowers of any kind, so far as known, within a quarter of a mile, and yet in less than two hours after the first one opened the honey-bees were on hand to gather the pollen. The nearest hive of bees is about a quarter of a mile away, and the mystery still is how the bees at that distance knew of the flowers. To the human sense of smell the flowers have no odor, but it may be just possible that they are as fragrant to the bees as the lilac, locust or buck-wheat is to us. The bee has not remarkably good eye-sight, and it does not appear that the wandering bee would have so soon discovered the flowers had he been obliged to depend upon sight alone.

CHINESE SOAP-BERRIES. — Our Kentucky coffee-tree (*Gymnocladus Canadensis*) has, contrary to the statement in some botanical works, several relatives in China, some of which are used for washing purposes. The seeds and pods are the parts used. It is known that our own tree has saponin in the bark and it may well be questioned whether the seeds do not contain saponin also. The name of coffee-tree is said to be applied to this species because in the early days it was used as a substitute for coffee, but if the seeds contain saponin such use may well be doubted. Can any of our readers add anything to the solution of this puzzle? Do the seeds really contain saponin? Will someone in the region inhabited by the tree investigate and report?

AN AVIAN HERBORIZER.—The Australian bower bird has become famous for its habit of constructing play-houses, which it ornaments with various bright objects, but according to the *Oologist* our own red-shouldered hawk, though less renowned, has the some taste for the beautiful. The majority of red-shouldered hawks' nests are decorated with fresh leaves and flowers, the inclination for these ornaments seeming to increase as the nesting season advances. One nest is mentioned by the *Oologist* that was lined with the fresh green leaves of the "box-berry" (wintergreen) and the surrounding platform concealed beneath a profusion of spruce twigs covered with their green needles. Entire plants of violets are also used, and the latter have been found in the nest so recently gathered that the flowers had not begun to droop.

ERRONEOUS BOTANY.—In a recent address Dr. W. F. Ganong called attention to the fact that when once an error gets into the text-books it is copied and passed along by other writers without hesitation. So great is our respect for the "authorities" that we seldom question a statement made with any show of erudition. If anyone doubts this he has but to get down his manual and see what the books say about the color of the ripe berries of the false Solomon's seal (*Smilacina racemosa*) and then compare this statement with the berries as they are. A few instances of this kind—and the botanical works contain many—ought to make all students a bit more hesitant in accepting facts encountered in botanical writings.

THE PLEASURES OF AN INVESTIGATOR.—Dr. E. L. Nichols, speaking before the Eastern Association of Physics Teachers at Boston recently, told of the pleasures of original investigation that may come to the student of physics. The physicists, however, have no monopoly of the pleasures of investigation. The botanical student has but to substitute botany for physics in the paragraph here quoted to make it applicable to his own line of work. "To be an investigator at all, one must have followed at least one line to the boundary which separates the known from the unknown and must interest himself not for a day, but daily year in and year out in finding trails leading outward into the wilderness. To pick out such a trail and blaze it a little way for the benefit of those who shall come after is to my mind what makes physics a live subject and the most fascinating pursuit in which a man can engage."

BIRDS AS BOTANISTS.—A British paper has recently commented upon the fact that in that country certain species of trees are likely to harbor peculiar kinds of birds. The oak is said to be the favorite with rooks and jays, and the beech with woodpeckers. In America many similar associations may be noted as the oriole and elm, the cat-bird and hawthorn, the yellow warbler and willow, the crow and the pine, etc. Such associations do not hold for all regions, unless the range of bird and tree are co-extensive, but it is conspicuous enough to be noticeable. In most cases this association is concerned with nest building, but it is difficult in some cases to understand why one tree is not as good as another for such purposes.

PROPAGATING SHRUBS.—Shrubs are best propagated from seeds. The seeds are slow to germinate, but if one has an out-of-the-way corner in the garden where the seeds may be planted as fast as one happens to collect them it will not be long before the corner yields annually a good number of choice seedlings. Such plants as send up new shoots from adventitious buds on the roots are easily multiplied in this way, while many others can be layered like grape-vines by bending down a branch, making a slanting cut half through it on the under side and covering the cut section with earth, allowing the tip of the branch to project above the surface. By autumn the branch will usually have produced roots from the edges of the cut and may now be severed from the parent plant and planted by itself.

THE BIONOMIST.—The United States Bureau of Plant Industry has a new official, or rather an old official, under a new title, this title being the Bionomist. It may puzzle our younger readers to define just what a bionomist is, and it will not be much help to look in the dictionaries, for the word is too rare to appear in many of them. Bionomy, however, is defined as a rare term for physiology, and possibly a bionomist is a still rarer form of a plant physiologist. It is a pleasure to note that the Department of Agriculture is ever on the look-out for rareties. A great government like our own, however, cannot be too careful in the terms used to designate the heads of important divisions, and before adopting as final this new title of Bionomist, might carefully investigate the respective merits of Phytononist, Phytotomist, Phytopathologist and Phytophysiologist. There is no use in having common names for things when rare ones are so ornamental.

THE EFFECTS OF COLD ON PLANTS.—It is well known that freezing does not kill all kinds of plants, and many investigators have endeavored to discover why different species should behave so differently under the lowering of the temperature. For a long time it was thought that during cold weather the ice formed in the cells of plants and expanding ruptured the cell-walls, thus killing the cells. This, according to K. M. Wiegand, in the February *Plant World*, is an error. Unless the temperature is lowered very rapidly no ice usually forms in the cells. The ice occurs in the intercellular spaces and begins to form on the outside of the cells, drawing the water from the cells for the purpose. During extreme cold the water may be nearly all drawn from the cells, causing the cell walls to collapse. Upon the return of milder weather the ice gradually melts and the cells again absorb the water. The death of the cells, therefore, seems to be due more to the drying out of the cell in the process of freezing than to the mere chilling of the plant. Plants with cells that can endure this drying under frost are not killed by low temperatures. In some dryish winter buds the temperature must fall to zero or below before ice crystals begin to form, but other buds may be frozen solid at higher temperatures.

Editorial.

This month, in response to the general demand, we use a larger amount of Note and Comment and we take the occasion to again and more pointedly urge our readers to contribute to this department. In your rambles this spring and during the summer almost anything that is worth your attention in the field is worth writing about. Send such observations in by postal card while they are fresh in mind. Many botanizers keep a note-book in which are jotted down notes, queries, opinions and reflections about plants in general. We want similar notes. Hunt up your old note-books and let us enjoy the things that make botany interesting to you.

* * *

After all, there is a charm about mere plant collecting that cannot be derived from any other branch of botany. All the delights of exploration and discovery await us in the nearest piece of wild land. We may have passed that way before, but the secrets of wood and field are not exhausted by one or by several such trips. And every recurring season brings new delights. For the beginner there are always new and strange plants to pique his curiosity and tantalize him until names for them are found; and for the older student, familiar with the names, there is the finding of the plants, each year anew, which is almost as good as the original discovery. But who that really loves the wild flowers will manifest his regard for them by gathering every one he can find? The fact is, the real lover of nature rarely comes back from an excursion laden with specimens. The individual with an armful of broken branches and drooping buds may tell you that she is an ardent lover of nature, but you may be permitted to doubt it. Far better than the indiscriminate flower-gatherer is the herborizer with vasculum and press, but fortunately that relic of a former generation is fast going out of style. Very little can be said against the student with an herbarium collected by himself, but the average individual who by exchanging aims to amass a large herbarium—as if mere size were a desideratum—might better be engaged in collecting postage stamps or tobacco tags.

* * *

If you have extensive grounds there is yet time to select for planting the wild shrubs and trees that prolong autumn into winter and attract the late birds by their berries. If your grounds are too small for shrubbery you may still transplant columbine, blue-bells, trilliums, asters, sunflowers, and many another to brighten the place until frost. If you have no grounds at all, the best advice that can be given you is to move. You cannot understand how much you are missing until you have poked about among the dead leaves in the borders of your own grounds and found the fresh, green spires of developing plants peeping above the mould early in spring, or watched the same tiny green spires wax strong and vigorous, unfurling at last their handsome flowers for your delight and comfort.

* * *

All flowers, even the so-called florist's flowers, are found wild somewhere or are descended from wild ancestry. Many of those offered by the plant dealer are most desirable for cultivation even by the botanist. Of course, the botanist will take care to select perennials and such perennials as have not been tampered with by the florist until stamens have been turned to leaves and the flowers bred into monstrosities. There is a long list to select from, and among the best are the lilies, irises, columbines, phloxes, pinks, poppies, and bellworts. Many of these no doubt are growing in the nearest old-fashioned garden and crowns might be had for the asking.

BOOKS AND WRITERS.

Plants have their diseases no less than animals, and, as is the case of animals, a large number of these diseases are due to bacteria or fungi. The mushrooms, puff-balls and shelf-fungi feed for the most part on the dead or dying parts of plants, but there are some, even in these groups, that may be the cause of the death of trees. The great sources of disease in plants, however, are the rusts, smuts and mildews, which seize upon living plants and soon put an end to their existence. The great number of these pests makes a knowledge of how to combat them most essential to the farmers. Plant diseases annually cause losses amounting to millions in every state in the Union. To prevent some of these losses by its farmres the state of Minnesota has issued a fine volume, entitled "Minnesota Plant Diseases," by Dr. E. M. Freeman. It contains nearly five hundred octavo pages, and is divided into two parts, the first treating of the growth structure and reproduction of the fungus groups and the second dealing with the specific forms which cause plant diseases and the methods of exterminating them. More than two hundred excellent illustrations, most of them from photographs, are given and the book is a most desirable addition to the library of the fungus student, whether resident of Minnesota or not.

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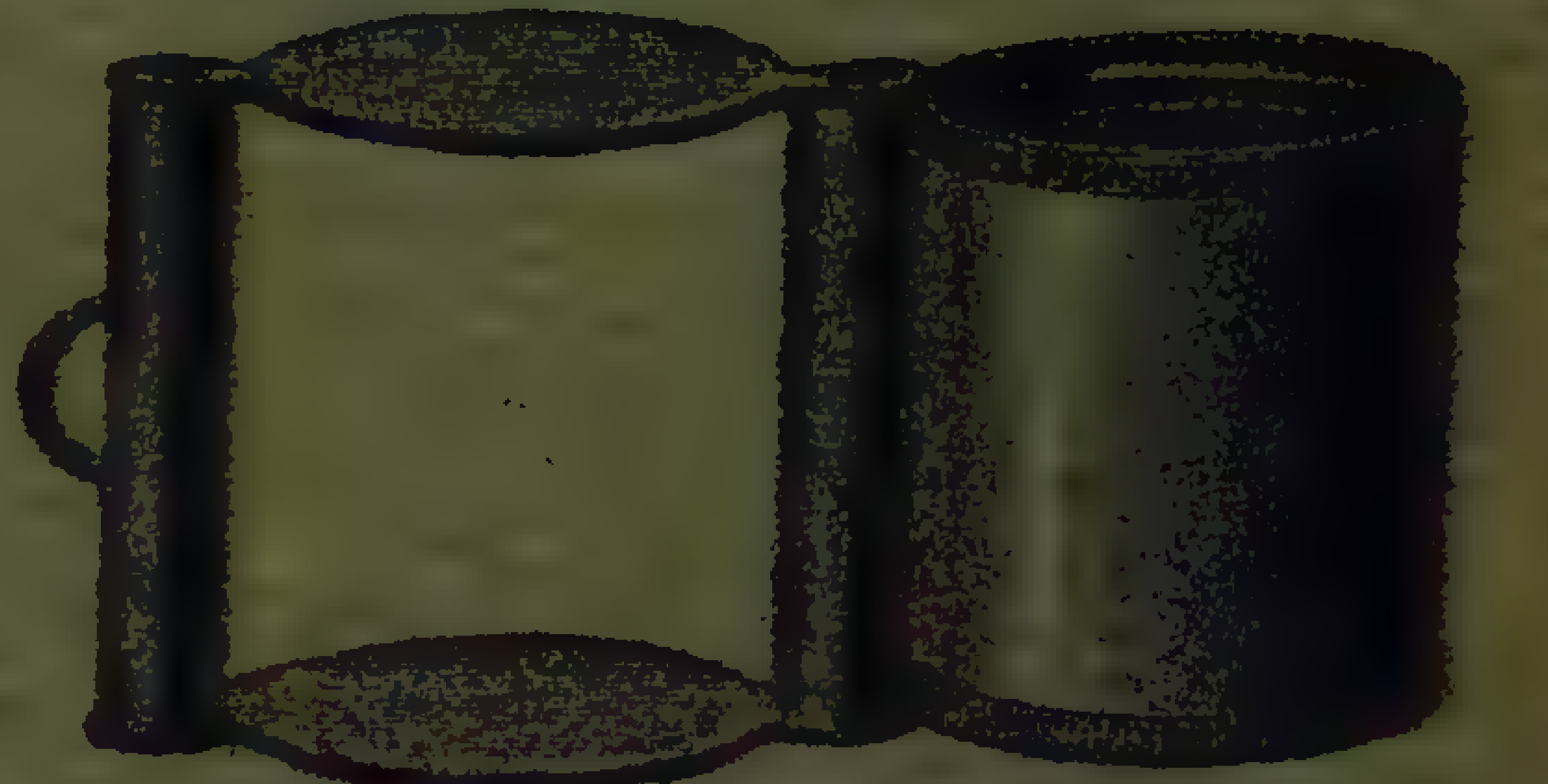

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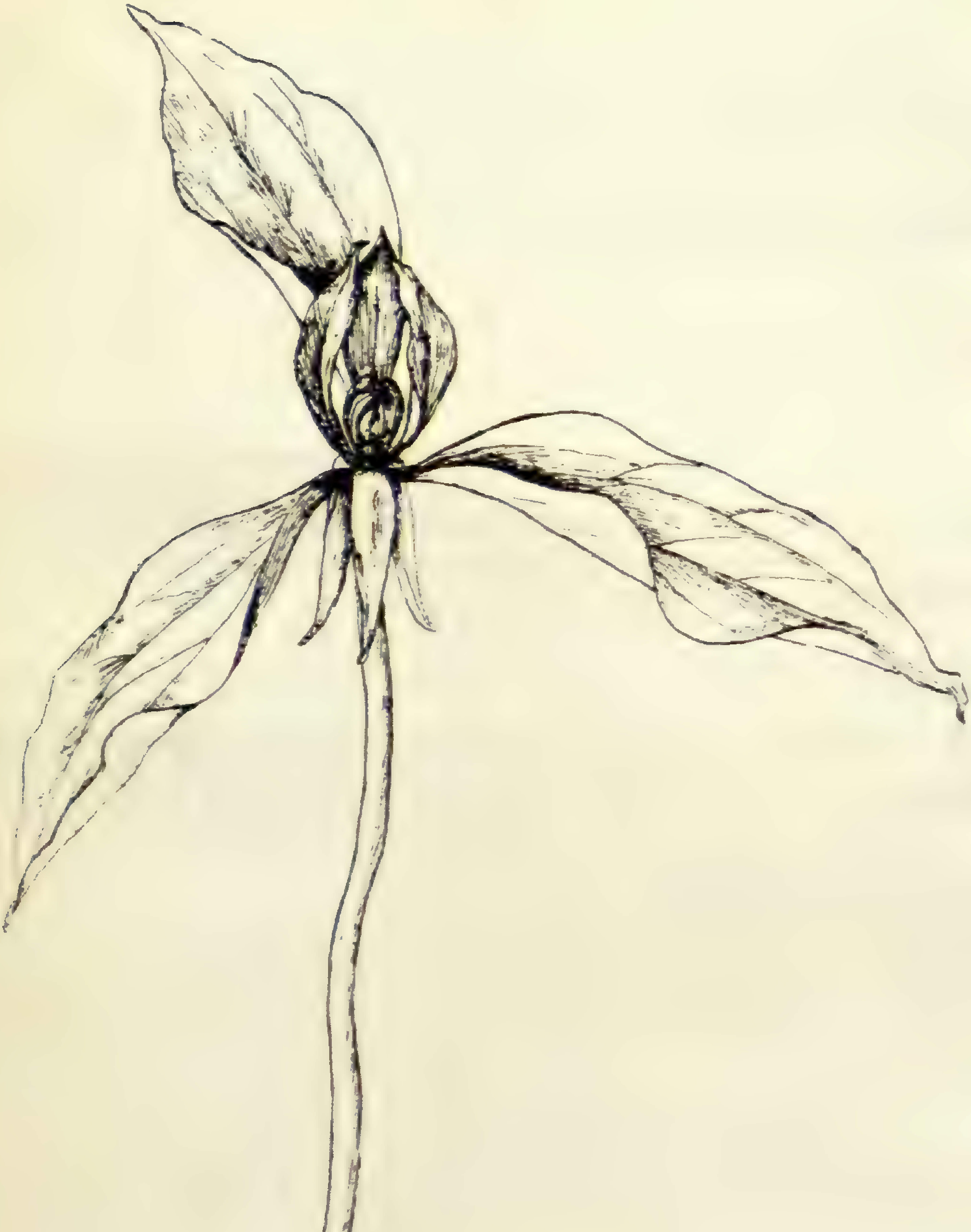

THE RECURVED TRILLIUM—*Trillium recurvatum.*

THE AMERICAN BOTANIST

VOL. X JOLIET, ILL., MAY, 1906. No. 5

OUR NATIVE LILIES.

IT is surprising to find how many flowers called lilies are not lilies when we come to examine the matter. If we assume, as seems proper that the true lilies belong to the family Liliaceæ, then the calla lily is not a lily, nor the water-lily, the Atamasco lily, the frog lily, the black-berry lily or the wood lilies. Day lilies, Easter lilies and meadow lilies are lilies in the sense that they belong to the lily family, but very few of these belong to the genus *Lilium,* to which in the narrower sense all lilies belong.

There are some fifty or more species of true lilies in the world, the great majority in the north temperate zone, where they completely encircle the earth. Usually there are not many species in any one locality, and their very distinctive habits make them among the most satisfactory of plants for the beginning botanist to identify. Best known of American lilies are probably the three common to the Northeastern states—at least most has been written about them. The earliest is the wild red, fire or Philadelphia lily (*Lilium Philadelphicum*), which must be looked for in June or July in open, broad-leaved forests, and bushy "slashings." Its short stem, topped by one or two erect fire-red blossoms, will identify it at sight. From Ohio westward this species has a close relative called *Lilium umbellatum.* It has narrower leaves, alternate instead of verticillate on the stem. In the Southern states the common species gives place to the southern red lily (*L. Catesbaei*), which has narrow, appressed leaves and long-pointed perianth segments. The wild yellow lily (*L. Canadense*), which, as has been noted in this magazine, is as often red as yellow, is the common lily of meadows and low grounds. Its flowers are turned toward the ground and there are usually several on a stem. It often grows thickly in meadows, though cut down year after year with the hay just as it is coming into flower. In the mountains of Virginia and North Carolina this has a resembling species in *Lilium Grayi,* named for the famous botanist. It may be distinguished from the common one by the fact that the perianth segments do not spread so widely. The turkscap lily, well named *Lilium superbum,* is our finest eastern lily. It should be sought in low grounds and on the banks of streams. In favorable situations it sends up a gigantic stem, which may produce thirty or more blossoms. Commonly the flowers are not more than half a dozen in number. This species has some resemblance to the meadow lily, its flowers being of about the same color and also facing the earth, but it never need be confused with the meadow lily, because its perianth segments turn back, similar to those of the tiger-lily (*L. tigrinum*) of old-fashioned gardens. In fact, it is often called wild tiger-lily, from this resemblance. It, too, has a southern relative (*L. Carolinianum*), which is shorter, with fewer flowers, and leaves of a different shape. This ends the list of the true lilies. Mention may be made, however, of the day lily (*Hemerocallis fulva*), a common escape from old gardens in many parts of America. It may be known at once from the true lilies by the long flag-like leaves rising from a stem that remains underground. The two or three pale yellow-and-orange flowers rise on long stalks and last but a short time. Its relative, the lemon lily (*H. flava*), is still cultivated in gardens and occasionally is found as an escape. Its clear yellow blossoms distinguishes it from the commoner species which it otherwise closely resembles.

At times much depends upon the mere dictum of the taxonomist. Not so long ago the lily-of-the-valley and the wood lilies, or trilliums, were considered to be in good standing as members of the lily family. Now, alas, their birthright has been taken from them and they have been grouped with others of like character in a separate family. To this group the lily-of-the-valley gives a name, but the trilliums are easily the most regal members of it, and will continue to be lilies in form and lilies in name to the common people in spite of the word of the botanist.

Like the members of the *Lilium* genus, the trilliums are well marked and easily identified. They are also widely distributed and far more numerous as to individuals than the lilies ever are. They come long before the true lilies do and have usually ceased blooming before their splendid cousins have become conspicuous. We have room here to mention the species of the Northeastern states only. The first to appear is the small white species (*Trillium nivale*), which inhabits the states north of the Ohio river. It often appears in March, and therefore is not to be confused with the great white trillium (*T. grandiflorum*). This is the largest and handsomest species of the genus, and as common as it is handsome. It is found in practically all the territory east of the Mississippi River and also in Canada. The pure-white flowers usually turn to a clear pink with age. All the trilliums are occasionally called wake-robins, but by common consent the title is allowed to *Trillium erectum*. How this species, which usually droops its blossoms toward or below the leaves, and practically never has them really erect, came to be named *erectum* is a botanical mystery not yet solved. It is an ill-scented blossom, though not without attractiveness, for the dull-red petals are of a color uncommon in our flora. To see the great white trillium and this plant growing together in the Eastern states, no one would think of mistaking them, and yet, in the middle west the red fades out of the latter's petals and they too take on a pure-white hue, which is very puzzling to the novice. Curiously enough, with this adoption of the purer color the odor that characterizes the red flower largely disappears.

Two other trilliums that have red flowers are the species called *recurvatum* and *sessile*. They are not to be mistaken for *T. erectum* under any circumstances, for the flowers of these two are closely sessile, and the flowers of the other are stalked. Between themselves, the resemblance is so close that the beginner usually decides them to be forms of a single species. In *T. recurvatum*, however, the leaves are petioled and the sepals are reflexed; in *T. sessile* even the leaves are sessile and the sepals are erect.

The wake-robin is not the only trillium with nodding flowers. In *Trillium cernuum* the flowers are deflexed beneath the leaves, and being rather small are often passed under the impression that the plant is not in bloom. The petals are white, rather narrow, and rolled backward. The last of the eastern trilliums is *T. erythrocarpum*, readily separated from the others by means of the deep pink veins running lengthwise of the white petals. It loves the moist woodlands, but may often be found in open swamps.

A STUDY OF YEARS.

BY MRS. M. F. BRADSHAW.

THIS story I am going to tell you is a serial, not monthly, as stories usually come, but continuous for years, and not yet finished. In May, some years ago, we were botanizing for a week or two, at the beach, reveling in California wild flowers at their very best. The particular bit of coast where my summer home is located, has some unique characteristics. We all know that the mountains have one class of flowers, the valleys another, the beach another.

But here the mountains come down to the sea, and their steep slopes face south and southwest and there is never any frost. So we have the conditions mixed, and here we could reasonably expect to find some unusual and rare plants, and so it has proved, for we found one never before collected in the United States, though a known Lower California species—*Verbesina dessita*. And there are a number of others rarely seen and all most interesting studies. We had come to the place in our evolution as botanists where a new plant was an event.

There was an insignificant bunch of pale leaves near the ground that we passed by at first, because we saw no flowers with it, and there were so many, many flowers, so many kinds, so many colors, such lavish display everywhere, that how could we be attracted at first by a few lowly, rather yellow, and worn-looking leaves? But inevitably the day came when we brought in the plant and gave it careful study. The leaves were growing on a running stock about one and a half inches below ground; they were about the size and much the shape of violet leaves, which set us first to studying the violet family. There were growing from the tufts of leaves little buds, as we thought, just appearing and nearly sessile; a lens, however, revealed the fact that our buds were seed capsules, but we were not botanists enough to determine what they were. This mysterious method of bearing seed below ground was something new, and so we sent specimens of the plant to a local botanist, who had always helped us out of previous difficulties, and who is an authority on Southern California flora. He wrote back for more material, but owing to his having forgotten temporarily my name, I never got the two letters he sent and a third one came too late for that season. Meantime, we had gone to the beach again the last of June and found our little plant had disappeared. But digging in the place we thought it had been, we found some of it below ground, where it was waiting dormant for its next year's short lease of life in the world above. Carefully digging it up we sent it to our California friend and also to Dr. Robinson, of Harvard. Dr. Robinson wrote us it was *Dichondra repens,* of the Convolvulus family. Looking up this species in the Botany of California, we found that it has a yellow corolla, but no mention of an underground habit of seed-making. Now, so far, we had not found any corolla, and doubted our plant's having any. In August we again searched out the plant, no vestige of it remaining above ground. The seeds this time were matured and we gathered some for our seed collection, less than a dozen. There was no doubt of the Convolvulus now, but the plant's original ways were still to be studied, and we resolved to see it every month of the next year. So in the meantime all available literature on cleistogamous plants was read, and we found that a few plants flower above ground and then bend down and bury their heads to mature their seeds. Some have no real flower, but turn from buds to seed capsules. Not one, however, but at some time was living above ground. Now, our plant grew its seed below ground on stems from an eighth to a fourth of an inch long, and so never coming within an inch of the surface.

Beginning the next spring as early as seemed reasonable—in March—we found our plant just peeping above ground, with no signs of flowers, so now only April remained in which it might show its corolla to the world if it ever had any. April found me just trying to recover from an illness that left a bad cough; so to the mountains I was sent, and must wait one whole year to read the April installment of my story. But the years slip away, and when another April came my interest in the little *Dichondra* was as fresh as ever, and to the beach we went, solely to look it up and resume our acquaintance. When I mention it is twenty-five miles to the cottage—a remote, isolated place, and a full five miles farther to the place where the plant grew, and no way to get there but to drive; a shut-up cottage to open and nothing to eat except what we took from home—well, you can credit us with some genuine interest in nature and her wondrous ways.

This time there was a corolla, a microscopic thing, and crimson instead of yellow. Now, the color of the flower would scarcely be reason for throwing over the specific name given in the Botany of California, but why does not this work mention the extraordinary method of growing its seed? Since I have never read of this characteristic in any work on plants, I would like to know if any other known plant has it, and if anyone has found such a plant, where I can find an account of it.

Orange, Cal.

THE CHOCOLATE PLANT.

BY DR. WM. WHITMAN BAILEY.

THE scientific name of the chocolate plant was one of those happy inspirations that much too infrequently attend the recognition of a new genus. *Theobroma*, food of the gods—it has all the requirements of a good title; it is sonorous, euphonious, poetical, designative, suggestive, truthful. One of those few plants of beneficent quality, without which it would seem that its original possessors could in no way dispense, it had but to be discovered by the European, to, like tobacco, make itself necessary to the whole world. "Breathes there the man with soul so dead" to choice flavors that he does not appreciate, and at times ever yearn for chocolate? What a happy blending or intermarriage of two tropical luxuries when someone learned—

or did it come by intuition—to bring vanilla and chocolate together in the same divine composition?

Much has been written or suggested about the true food of the gods, and wild guesses made as to the nature of nectar and ambrosia. We strongly suspect that the divinities really had very indifferent victuals and drink. What was metheglia to regal, soul-gratifying chocolate? Funny! In those old classic times the all-knowing gods kenned not chocolate. It belonged to a new world, and to a more primitive set of divinities and heroes!

The chocolate plant belongs to the small family Sterculiaceæ, not remote from mallows, and to which we also attribute the pretty hot-house shrub, now old-fashioned and vanishing, with honey-yellow flowers, the *Mahernia verticillata*. As implied above, it is strictly American, and found only in the tropics.

There are eight or ten species of *Theobroma,* but the well-known food plant is *T. Cacao.* It has naught to do with *Cocos*, the cocoa-nut, which is a palm, nor with Coca, the familiar anæsthetic drug derived from *Erythroxylon.* It is very unfortunate that the names of these plants, so unlike in relationship and properties, should be so similar.

The chocolate tree is a small one, less than twenty feet high, as a rule, with large, oblong, taper-pointed leaves. There is a pretty contrast in the flowers, which are borne in clusters, between the rose-colored calyx and yellowish corolla. The ovary ripens into a sort of pod, of which every portion is of economic use as a food or drink. The true chocolate is prepared from the seeds. "When ripe the fruits turn yellow outside and they are then gathered by hand, afterwards split open, and the seeds removed. These are then made to undergo a slight amount of fermentation, or sweating, lasting from one to two days, for the purpose of developing their color, and are afterwards exposed to the sun daily for about three weeks, or until they are thoroughly dry, when they are packed for exportation."

Not only is chocolate delicious to the taste of most people, but it is nutritious, refreshing and devoid of any noxious or stimulating alkaloids, unlike coffee or tea, which are partaken of as infusions; chocolate (unless in the case of the inferior drink called "shells") is taken directly into the stomach and acts as food.

Brown University, Providence, R. I.

HOW TO BEGIN BOTANY.

BY WILLARD N. CLUTE.

THE student who is taking up botany at present can scarcely realize the difficulties that presented themselves to the plant student fifteen or twenty years ago. Then the names of our familiar wild flowers could not be learned by comparing the plant with its picture in a book, for there were no books. Of course, there were technical manuals earlier than that, but it required considerable study before the knowledge locked up in these volumes became intelligible to the ordinary mortal. It is small wonder that botanists in those days were exceedingly rare. Such botanists as there were, however, were usually deeply learned in their subject, for no one took up the study of plants at that time unless he was urged on by his love of the science.

The past few years have witnessed the production of a vast array of books designed to smooth the way for the plant student, until the merest novice may know the names of the showy wildflowers. His only perplexity is likely to be not where to find a book devoted to plants, but which book of the many to select. The following observations are designed to assist the novice in selecting.

A knowledge of the names of plants is far from constituting a botanical education, but it is usually the first step in that direction. There are two ways of obtaining these names: one by a careful study of botanical terms and the relation of the parts of the plant to each other, after which any native plant may be easily run down by means of the keys in the manual; the other by the more or less artificial schemes in the popular handbooks, such as the identification of flowers on the basis of color, habitat, etc. Since this latter method appeals most strongly to the beginner, we will take it up first.

In my opinion, if one wishes to know the names of our showy wildflowers only, Dana's "How to Know the Wildflowers" ($2.16) is still far ahead of all competitors in the Northeastern States and Canada. On the west coast Parsons' "Wildflowers of California" ($2.00) is a most desirable book. For the Gulf States, Lounsberry's "Southern Wildflowers and Trees" ($3.71), though having various defects, is the only popular work. There are several other books good for use in the Eastern States, among which may be mentioned Matthews' "Field-Book of American Wildflowers" ($1.87) and Lounsberry's "Guide to the Wildflowers" ($1.92). All these are profusely illustrated, and when one is really interested in the wildflowers, all are likely to find their way to his book-shelves in time. Each treats the subject somewhat differently, so that one may gain valuable help from this multitude of counselors.

It is to be regretted that so many people lose interest in the plants as soon as they learn their names. Possibly this is due in part to the popular handbooks themselves, which give prominence only to the plants with conspicuous flowers and often ignore the others entirely. When one has become pretty familiar with his popular books he is frequently exasperated to find that they do not contain a mention of numerous plants that grow in his region. At this point he is ripe for the botanical manual, which contains descriptions of all the plants even to the most insignificant weeds. It is a satisfaction in studying over a new plant to feel that somewhere in your book the plant is properly recorded. The botanical manuals are cast on strictly scientific lines, and the terms are exact and therefore technical, but no one need think himself much of a botanist until he can handle such a manual with facility. "Gray's Manual" ($1.75) is without doubt the best for the Northeastern States, and Chapman's "Flora of the Southern States" ($4.18) is best for the Gulf States. In the region covered by Gray's manual there is another called familiarly "Britton's Manual" ($2.40), but the species are so finely subdivided that only the experienced botanist will find it useful. A similar volume in the Southern States, Small's "Southern Flora" ($4.00), is much too complicated for the beginner. Coulter's "Botany of the Rocky Mountains" ($1.75) and Coulter and Gray's "Text-Book of Western Botany" ($2.25) are the principal books in their region.

The trees are included in all botanical manuals and in most of the popular handbooks, but there is such an individuality about them that various books devoted exclusively to them have been issued. To get the best, I would advise Keeler's "Our Native Trees" ($2.15), and as a companion volume the same author's "Our Northern Shrubs" ($2.16). Some might be inclined to select Lounsberry's "Guide to the Trees" ($1.92) because of the colored plates, but Keeler's books have a greater amount of information. For a book to continue the study of shrubs into late autumn, Peterson's "How to Know Wild Fruits" ($1.62) will be useful, and in winter Huntington's "Studies of Trees in Winter" ($2.25) will be excellent. Newhall's "Trees of Northeastern America" ($1.75) is older than any of the foregoing, but is still useful.

After the flowering plants become well known one often has a desire to specialize among the lower plants. For a single book on ferns, select Clute's "Our Ferns in Their Haunts" ($2.15); for the next best Parson's "How to Know the Ferns" ($1.63). Water's "Ferns" ($3.30) is also desirable for reference. In fern allies there is but one book, "Clute's Fern Allies of North America" ($2.00). All these are popular handbooks for naming the plants. For a technical book select Underwood's "Our Native Ferns" ($1.08). In mosses, Grout's "Mosses With a Hand Lens" ($1.75) is most desirable. Of the various books on mushrooms, Atkinson's "Mushrooms, Edible and Poisonous" ($3.00) and Marshall's "Mushroom Book" ($4.00) are about evenly matched. Marshall's book is probably best for the beginner, Atkinson's being the more technical. Both are well illustrated. For a text-book covering the whole field of the fungi, Underwood's "Moulds, Mildews and Mushrooms" ($1.60) may be selected. Schneider's "Guide to the Study of Lichens" ($2.50) and Sargent's "Lichenology for Beginners" (50c) are both excellent.

All the books thus far mentioned may be listed as so many helps to becoming acquainted with the plants, but many of the most enduring pleasures of botany do not appear until the names of the plants are known. Not until one has a general knowledge of plants and plant relationships can he understand and enjoy the best literature of the subject. Then such books as Dana's "According to Season" ($1.92), Wright's "Flowers and Ferns in Their Haunts" ($2.65), Flint's "Garden of Simples" ($1.62) and many others will have a new charm. As one extends his acquaintance with the plants more and more of such books find their way to his library until all have a place.

The young botanizer, long before he has reached the stage where anything more than a guide to the names of the flowers is necessary, usually wants to make a collection. The best book on this subject is probably Clute's "Making of an Herbarium" (25c). Bailey's "Botanizing" (75c) is somewhat larger and equally desirable. Both these books give information about driers, presses, etc., but it may be added here that the cheapest and most useful plant-press is made from two sheets of stout binder's-board, to be obtained at the nearest book-bindery, held together by two straps. The best driers may be cut from deadening felt such as builders use and which may be obtained at most hardware or wholesale paper houses. The ordinary trowel, sold for 5 or 10 cents is not good enough for most work. A Cleves' angle trowel, costing from 25 to 40 cents, according to size, is the best to be had anywhere. For collecting living plants to study while fresh, one needs a vasculum of tin. Any tin box that will keep the plants moist, but not wet, will answer. A regular vasculum may be bought for 75 cents and upward, or the nearest tinsmith can make one to order from a description or a picture. It is a mistake for the field botanist to load himself down with paraphernalia. His favorite handbook or manual should always go with him to the field, however. It is astonishing to see how much easier plants are identified in the field than they are when examined at home. A good lens is also an absolute necessity to the plant student. The cheapest may be purchased for 15 to 25 cents, and the most expensive costs $5 or more. After trying a large number of varying excellence we have come to favor the lenses sold by Williams, Brown & Earle, at $1.25 and advertised in this journal. The Coddington lenses, heretofore the cheapest acromatic lenses, cost from $1.50 upward, and are more bulky, without an increase in the magnifying power.

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

USEFUL MOSQUITOES.—There is probably very little to be said in favor of the pestiferous mosquito, but it may possibly be set down to its credit that it occasionally transports the pollina of the green orchis (*Habenaria hyperborea*) from flower to flower.

FERTILIZATION IN THE GINGKO.—The gingko, or Chinese maiden hair tree (*Gingko biloba*), which is now often planted for shade in this country, is a remarkable tree in many ways. Although so closely related to the pines as to often be placed in the same order, the leaves are flat and expanded, instead of needle-shaped, and veined exactly like those of the maiden-hair fern. The fruits are not cones, but look like yellow plums, and are manifestly nearer the structure of the fruits of the yew, juniper and similar "conifers." In ordinary plants after pollination, the pollen tube grows down through the pistil until its contents fuse with those of the embaryo-sac before a seed can result. In the gingko, on the contrary, the fruit may mature and finally drop from the tree before this fusing of pollen tube and embryo-sac contents has been accomplished.

THE VALUE OF COMMON OBJECTS.—Why should men be sending off to mid-Africa for plants and shrubs to decorate their homes, wasting their time and money in trying to keep them up in their unnatural surroundings when nearly every roadside and woodland contains many of our own plants that are fully equal in beauty and vastly better fitted for life here, but are passed by under the name of weeds? Why should many of our invaluable bits of natural scenery be continually torn up and "improved" for financial purposes? Why should it practically require an armed guard to prevent one of our stateliest and most venerable objects of national pride, the giant sequoias, in California, from being splintered into pickets for grape arbors? In most cases it is because the actual value of the country and of its common familiar objects is not known. Our education leads away from the woods and fields and waters, the atmosphere of our main occupation, instead of toward them.—*Nature Study Review.*

THE LIFE-SPAN OF PLANTS.—The big trees of California are without doubt, the very oldest vegetables on our planet. The sapling days of many of them date from before the Christian era. There are probably few, if any, other trees that under the most favorable circumstances would live as long. Plants have their old age and death as well as animals. It is a curious fact in this connection, that the life of many sorts of short-lived plants may be continued indefinitely by budding, grafting or layering. Some of our most desirable cultivated fruits have arisen from a single sport whose good qualities have been perpetuated by such means. Thus all the trees of a certain kinds are but so many parts of the original sport. In this way, though the individual tree may attain maturity and finally die, the life of the original is still carried by new grafts, and if there should happen to be someone at hand to continue the process by buds or scions, there seems to be no reason why the strain should not live forever.

DISTRIBUTION OF THE PIPSISSEWA. — Our common pipsissewa (*Chimaphila umbellata*) encircles the world in the north temperate zone, skipping only an occasional locality. Northward it extends nearly to the Arctic circle. Its relative, the spotted wintergreen (*C. maculata*), which, by the way, can hardly be properly described as spotted, is a strictly American plant with a much more restricted range, even in America. While this second species is absent from so much of the territory inhabited by *C. umbellata,* it is interesting to observe that in Japan a third species, *C. Japonica,* maintains much the same relation to the widespread species in Japan as *C. maculata* does here.

VIVIPAROUS FERNS.—Several species of ferns in our flora occasionally bear young plants upon their fronds. The best known of these is the walking fern (*Camptosorus rhizophyllus*), which normally bears a plantlet at the tip of each frond. A common greenhouse fern, *Asplenium bulbiferum,* produces numerous plantlets on various parts of the frond, and another species, *Polystichum angulare,* bears a row of close-set plants along the main stalk or rachis. The latest addition to this list is the bulb-bearing cystopteris (*Cystopteris bulbifera*), which in Vermont, recently developed a frond with young plants. This species is well known to produce bulblets from which, after they have fallen to the earth, young plants grow, but this seems to be the first recorded occurrence of young plants on the living frond. The specimen is figured in the October *Fern Bulletin.*

INTRODUCED WEEDS.—It is probable that few of us have any adequate idea of the number of introduced weeds in our flora. In a recent lecture to the Massachusetts Horticultural Society, M. L. Fernald stated that more than 600 species of plants have been introduced into the flora of New England. These introductions have had several ways of entrance. Some have come by way of the railway; others as ballast in ships from foreign ports, while still others arrived among seeds for field and garden, clinging to the coats of domestic animals, etc. Along one river in Connecticut the origin of great numbers of new weeds was traced to a rubber factory using old rubber shoes. In the linings of these shoes, which were thrown out, great numbers of weed seeds were hidden. We have sent few weeds to the Old World to balance accounts, but occasionally something is done to make the scores nearer even. Our common ditch moss (*Elodea*), which at home is a mild and inoffensive plant, has completely choked up many British streams and become a fair offset to the damage done by the water-cress (*Nasturtium*) in this country.

HABITAT OF THE LADY'S SLIPPER.—There are many curious things about the orchids besides their flowers and methods of pollination. It has been pretty well settled that some species may rest for a year or more without showing a sign of foliage above ground. Another interesting circumstance connected with these plants is the habitats selected by them. In some regions the pink lady's-slipper (*Cypripedium acaule*) is found only in swamps in the shade of hemlocks and other conifers; in others the plants grow on dryish hillsides. In the last-named localities the plants seem to delight in a moldering log, and are usually found in colonies along it. After the log has entirely disappeared one may often decide in which direction it extended, by the arrangement of the orchid colony. The yellow lady's-slippers (*C. pubescens* and *C. parviflorum*) are usually found on dryish hillsides, but they, too, may occasionally inhabit the swamps. The yellow species will thrive under cultivation, but the pink one usually dies after a year or two, which fact, taken in connection with its preference for old logs, seems to indicate that it is a partial saprophyte.

Editorial.

The long-delayed November and December numbers of this magazine have at last been mailed to all subscribers to the magazine for 1905. If any who are entitled to the numbers did not receive them we shall be glad to send others as soon as notified. In this connection we must thank our subscribers for their patience with us while overtaking our dates. We have not lost half a dozen subscribers on account of the delays in issuing, and now that we are again on time, we anticipate a steady increase in the subscription list.

* * *

Four years ago a small nature-study department was introduced into the program of the Connectitut Chautauqua Assembly. From this tentative beginning the department has grown to be among the most important upon the regular program. This year there will be a series of talks on birds, trees, flowers, ferns, insects, fungi, etc., each one of which is followed by a trip afield for the study and collection of specimens. The assembly is located in a large woodland in the midst of a piece of very attractive country for the nature student, and will be found to be a most delightful place to spend part of the summer vacation. Although located in the woods, the tents so conspicuous in many summer gatherings are entirely absent. All the buildings are modern and substantial. This year the session extends from July 12th to 25th. Folders giving further information about rates, other lectures, etc. may be obtained by addressing the Connecticut Chautauqua Association, 411 Windsor avenue, Hartford, Conn. The nature study work at the assembly will be under the direction of the editor of this magazine, who will be glad to meet any of his readers who may chance to attend.

* * *

The other day the editor of this magazine had an agreeable surprise, which he here purposes to pass along to his readers. Having occasion to order some books from D. Appleton & Co., of New York, he included in the order a copy of "The Plant World." It is probably unnecessary to add that the "Plant World" meant is not the magazine of that name, but the book by Frank Vincent, with the same title. We expected some treatise on the vegetable kingdom by a single writer, but were much pleased to find a series of fifty selections about plants from the master botanists of the world, such as Haeckel, Hartwig, Gage, M. C. Cooke, etc. These selections cover a wide range of subjects, from pitcher plants and pumpkins to palms, ferns, sea-weeds and the baobab. The book was issued eight years ago, and possibly most of our readers have seen it, but if not, it strikes us that all who like the general run of the articles appearing in the AMERICAN BOTANIST will take pleasure in owning this book, which contains 225 pages and costs but 65 cents. This notice is not a book review, and is printed here solely because we think our readers will enjoy this excellent little volume.

* * *

At the end of the present school year, Dr. William Whitman Bailey, who has so long held the chair of botany at Brown University, will resign his office into the hands of his assistant, Prof. J. Franklin Collins. Dr. Bailey is among the best-known of the older group of botanists and has enjoyed the friendship of nearly all the great men in his line of the generation that is passing. He is by no means an old man and while his health does not permit of the activities of school life we hope to have him with us for many years to come. May he live until the nomenclature question is settled to the satisfaction of everybody!

BOOKS AND WRITERS.

The *Gardening World,* of London, has issued two more numbers in its series of "Handbooks," these latter treating of "Dahlias" and "Annuals and Biennials." These handbooks are apparently most useful to British growers, and a similar departure by some of the gardening publications on this side ought to take.

The number of our wild plants that have medicinal properties is truly surprising. A list of these compiled by Alice Henkel has recently been issued by the United States Department of Agriculture. They are arranged alphabetically under the generic names accepted by radical botanists and the best-known common names are also given. The parts of the plant used are noted, and the distribution of each species is recorded. Not all the plants are officinal, but the officinal are carefully distinguished from the non-officinal. It is to be regretted that the nomenclature of this list, like the nomenclature of the latest edition of the United States Pharmacopœia, follows the *Hepatica Hepatica, Benzoin Benzoin,* foolishness showing how much damage an ill-advised scientist can do when unhampered.

MANDRAKE IN DEMAND.—It is believed that nearly 2,000,000 pounds of mandrake (*Podophyllum peltatum*) rootstock comes to market each year, most of it likely to appear again later in the guise of liver pills. Where the vast amount of the drug comes from is a mystery. The dried rootstock brings less than 10 cents a pound, and the price is not much of a temptation to dig it up.

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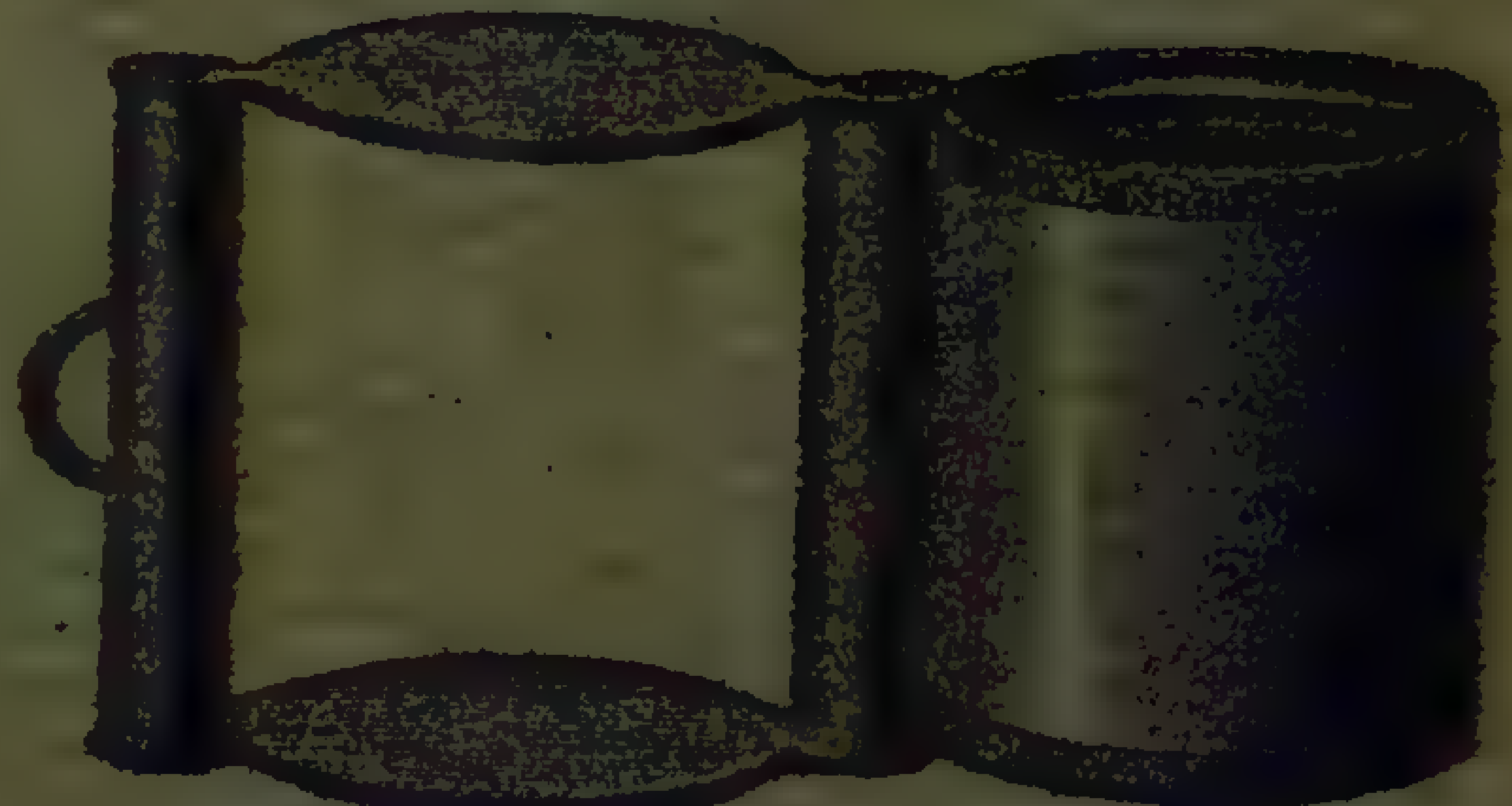

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BINGHAMTON, N. Y. JOLIET, ILL.

THE AMERICAN BOTANIST

A MONTHLY JOURNAL FOR THE PLANT LOVER

ISSUED ON THE 15th OF EACH MONTH

WILLARD N. CLUTE - - - - - - EDITOR

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Binghamton, N. Y. 118 Lincoln Street, Joliet, Ill.

Entered as mail matter of the second class at the post office, Joliet, Ill.

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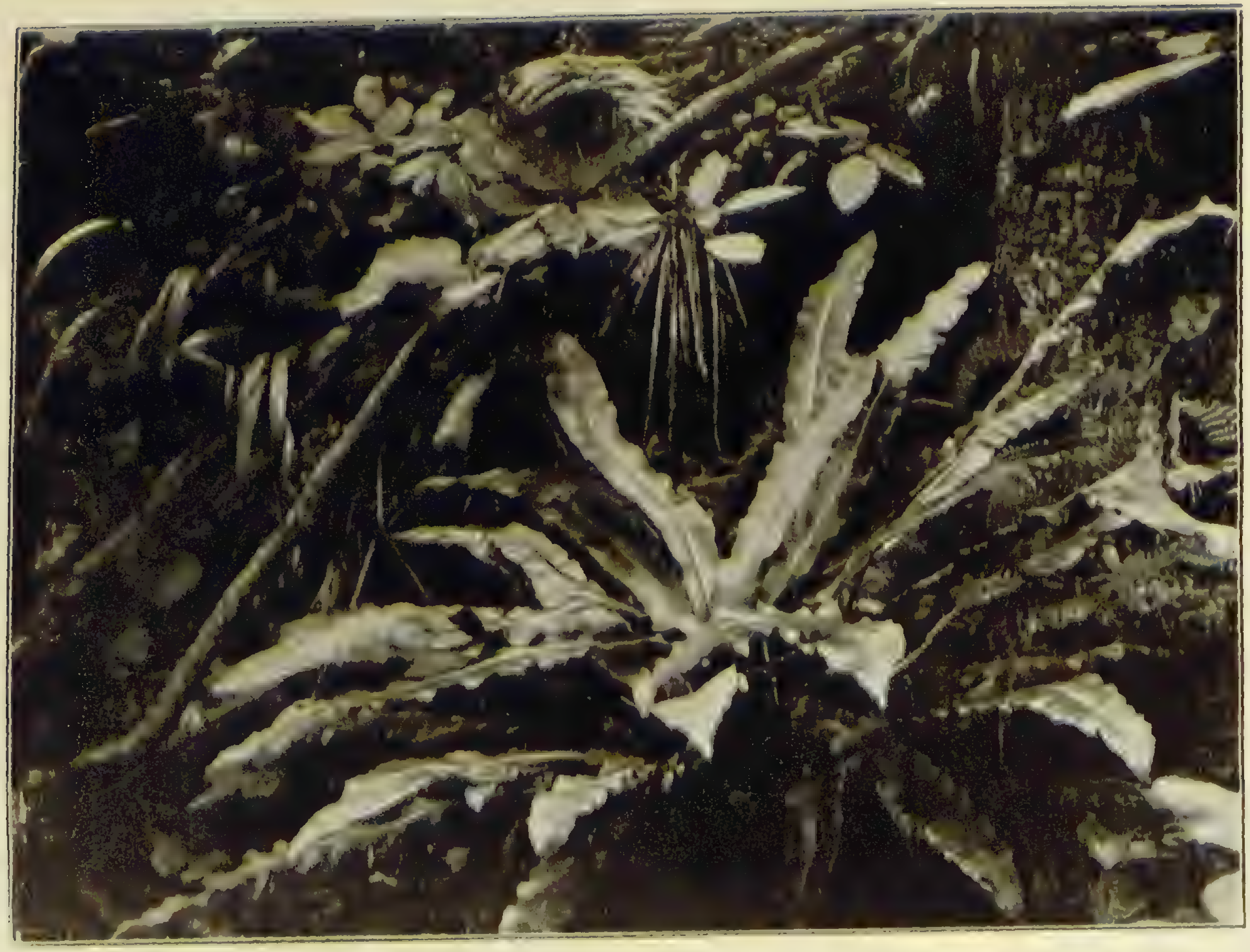

THE HART'S-TONGUE FERN AT HOME.

THE AMERICAN BOTANIST

VOL. X JOLIET, ILL., JUNE, 1906. No. 6

NAMING THE FERNS WITHOUT A BOOK.

BY WILLARD N. CLUTE.

ALL ferns look alike to the novice. Those of us who, by long association with these handsomest of plants, have arrived at a stage where we can recognize most of the common species at sight, whether in fruit or not, can look back to a time when the most conspicuous species was a puzzle and though in full fruit, was not easily identified by any book in our possession. With the increase in the study, books designed to help in naming the ferns have multiplied until even the novice rarely goes astray in his identifications. With a good book fern collecting becomes a pleasure instead of a serious study, but without a book the great majority of the species are easily recognized. He who does not have to hunt down his species through the mazes of a technical key, misdirected here and there by unfamiliar or half-understood terms, gains somewhat in the mere matter of time, but he misses something of that elation with which after a long chase we older ones pounced upon our quarry. We are not yet ready to give up the technical manuals entirely—they are still invaluable for settling questions of minute differences—and the popular books are almost indispensable, but much, as we have said, can be learned without one.

It need hardly be said, probably, that the spores of ferns are usually borne on the under side of the leaves, where the fruiting parts form curious dots of various shapes and sizes, and that the form and arrangement of these fruiting parts serve as a convenient means of identifying the species. In our study without a book, however, it will often be found easier to seize upon some prominent character that so plainly marks our species that it would seem as if nobody could mistake it.

Let us begin with some of these unique species. Unless one lives in New Jersey, Newfoundland or Cape Breton and Nova Scotia he need not expect to find the curly grass (*Schizaea pusilla*) and even if he does live in any of these places he must be prepared to search the cranberry bogs with his nose close to the ground for days and perhaps years before he finds it. The best way is to get a better informed friend to point it out. Then it can be found again easily if it occurs at all. All along the Atlantic coast from New Hampshire to Florida one may expect to find our only climbing fern (*Lygodium palmatum*). It is not found in every locality, however. One must search the bushy borders of swamps where he may be fortunate enough to discover the slender stems with rounded palmate leaflets twining about the stalks of other plants to the height of two or three feet. The Hart's-tongue (*Scolopendrium vulgare*) of which we present a picture in this issue, is too rare to be counted upon unless one lives in Central New York or the country east of Lake Huron. Our illustration is from a plant in its native haunts in Central New York and was photographed by Mr. H. E. Ransier. The fronds are unmistakable being a foot or more long and two or three inches wide with entire margins. The walking fern (*Camptosorus rhizophyllus*) is possibly as much sought for by the beginner as any species we could name. The title of walking fern has a peculiar charm and one always remembers his first sight of the curious fronds. Fortunately this fern is not so rare as the books would have it. Go to the nearest deep, shady woodland, search the moist, but not wet rocks, and when you find a plant with dark green leaves, heart-shaped at base and not half an inch wide and tapering gradually to a slender apex, rejoice. The whole plant may sometimes be covered by one hand. There is nothing else, so far as I know that looks much like it.

Leaving the rarities, let us glance at some of the common things, beginning with the very commonest. If you have ever seen a swamp in spring with ferns growing waist high in it, and if in the circles of fronds there appeared here and there brown, club-shaped spikes, know that you have seen the cinnamon fern (*Osmunda cinnamomea*). No other fern can be mistaken for it when thus in fruit, but unless one looks sharp he may pass unnoticed its nearest relative, the interrupted fern (*O. claytoniana.*) Its fruiting frond is not wholly brown, but has green leaflets at both base and apex. Several pairs of the middle leaflets are turned to fruiting bodies and by this sign, alone, you shall know it. The royal fern or flowering fern (*Osmunda regalis*) is another of this family, but in this only the upper part of the frond bears fruit. From its appearance it is called the flowering fern though no ferns, of course, ever bear flowers. No other fern fruits in this way. Look for it in swamps and wet woodlands.

There are several ferns with triangular fronds that for our purpose may well be classed together, though neither Nature nor the scientist would subscribe to such an arrangement. In dryish woodlands and along roadsides one is sure to find the largest of these triangular species. It belongs to the bracken (*Pteris aquilina*) so familiar to readers of English song and story. Often the fronds are three feet across. The fruit is borne in a narrow line on the borders of the leaflets. In moist woods occurs another triangular species. This is the rattlesnake fern (*Botrychium Virginianum*). It is a rather fleshy species, and may further be distinguished from the bracken by producing its fruit in a slender brown cluster that rises erect from the base of the green triangle. The rattlesnake fern fruits in early summer. In September and October another Botrychium, the grape fern (*B. ternatum*) appears. Its time of fruiting distinguishes it from all others but its much smaller size and its habitat in pastures and open woods will help. It may be said in passing that the species makers have operated upon this plant until they have described a large number of varieties of no especial importance. Still another triangular species is the little oak fern (*Phegopteris Dryopteris*). It is only a few inches high and delights in deep moist woods. The yellow-green fronds are like three tiny fronds in one and bear their fruits on the under-side of the leaf in the shape of tiny dots. It cannot be mistaken for any of the others. In dryish woods is another member of this family called the broad beech fern (*P. hexagonoptera*) and on wet rocks may be found still another, the common beech fern (*P. polypodioides*). These two latter are not easily confused with any of the others, but they resemble each other so much that one must resort to the books to make sure of his identification.

All these common species are deciduous except the grape fern which keeps its one fleshy leaf until time for a new one to start. We do not lack for evergreen species among common ferns, however. One that every rambler in rocky woodlands has seen is the Christmas fern (*Polystichum acrostichoides*). Its fronds are dark green and leathery and a foot or more long. The leaflets are eared on the upper side at base, and when the fruiting fronds appear they bear the fruit on the upper half of the frond which is abruptly narrowed for the purpose. No other species has this peculiarity. While in the rocky woods look for the polypody (*Polypodium vulgare*). It is nearly certain to be present. Examine the tops of shaded ledges, the crests of boulders and other dryish sterile places. The plant looks like the Christmas fern but is smaller, lacks the eared leaflets, the narrowed apex and its fruit is found in rather large roundish dots on the under surface. On such rocks one may find the common bladder fern (*Cystopteris fragilis*) and its ally the bulb-bearing bladder fern (*C. bulbifera*). The woodsias, too, especially *Woodsia obtusa* and the rusty woodsia (*W. Ilvensis*) may occur, but it is not easy to describe them so that the novice will recognize them. All are small or medium-sized ferns. *Cystopteris fragilis* is commonest. *C. bulbifera* thrives only on moist rocks while *Woodsia Ilvensis* almost insists on the tops of the driest rocks, often in full sunshine.

In almost every swamp one may find the sensitive fern (*Onoclea sensibilis*) with coarse and unfern-like foliage that is not at all sensitive to ordinary stimuli. Its fruit resembles small green or dark brown berries borne in compound spikes; they appear late in the year and often remain erect above the snow all winter. They are familiar objects to the rambler in winter. The ostrich fern (*Struthiopteris Germanica*) is a near relative. It has foliage like that of the cinnamon fern, but the fruit is produced late in the year and is more like that of the sensitive fern. Another fern that resembles the cinnamon fern is the common woodwardia or chain fern (*Woodwardia Virginica*). Its fronds do not grow in circles, however, and the fruit is borne in oblong dots on the under-side of the fronds. The sterile fronds of the narrow woodwardia (*W. Angustifolia*) resemble those of the sensitive fern but the fruit is borne on the under-side of the fronds instead of in berry-like spikes.

There is no use in describing the maidenhair (*Adiantum pedatum*) for everybody knows it, nor in describing the various members of the *Nephrodium* and *Asplenium* genera for they cannot be certainly separated without a book. It may be said, however, that the *Aspleniums* are mostly rock ferns and the *Nephrodiums* are so frequently found in woods as to be called wood ferns. In sandy or rocky woods one may find the ebony spleenwort (*Asplenium ebeneum*) and on shaded ledges the green rosettes of the maidenhair spleenwort (*A. trichomanes*) the silvery spleenwort (*Athyrium acrostichoides*) must be sought along woodland rills while the lady fern (*A. filix-foemina*) is everywhere. Among other rock spleenworts are several of our rarest species.

The commonest wood fern is the marginal shield fern (*Nephrodium marginale*) to be found in nearly all rocky woods. In dry woods look for the New York fern (*N. Noveboracense*) and in all swamps a slender species will prove to be the marsh fern (*N. thelypteris*). That tall finely dissected fern in rocky woods is the spinulose fern (*N. spinulosum*) which has many puzzling disguises. Goldie's fern (*N. Goldieanum*) is a large fern like *N. marginale.* It is not abundant, and therefore all the more desirable.

Space does not admit of a mention of all our species, nor all of even the common ones, but those mentioned may easily be identified this summer. As for the rest—it is good to have here and there a plant to pique the curiosity. With the mention of the boulder fern (*Dicksonia pilosiuscula*), a fragrant species in all elevated regions, I am done except to wish the novice fern student much pleasure and profit in naming his specimens.

MEADOW FLOWERS.

BY DR. WM. WHITMAN BAILEY.

THE tropics may boast of palms, bamboos, swinging vines which hang like cordage from the forest trees, and bizarre forms of orchids and bromeliads. We acknowledge the grandeur and beauty of all these, but still we think no southern forest can surpass, or even vie with an apple or peach orchard in full bloom; the woods when gay with dogwood, or splendid with mountain laurel. Then, above all, we have our meadows, billowy with grasses or bespangled with buttercups and daisies.

We find ourselves often endowing plants with human attributes, and each has its character and its special friendships. This idea formerly regarded as essentially poetical, now meets with scientific recognition in such terms as "plant communities" and a student in collecting is asked to note the associations which plants form with each other.

In early summer the meadows are yellow with bulbous buttercup—at least in New England. By the time this passes away, the ox-eye daisy will spread its stars over the lawn—so very beautiful if they were not so common. The "Marguerites" or "pearls" are ever associated with fortune telling—and it is not alone poor Gretchen who plucks their prophecying rays. The English daisy—"the wee crimson-tipped flower" of Burns, is a very different plant, and in America seen only in cultivation in lawns or in garden beds.

At this season we often see a red flush over the meadows. It is caused by the sheep-sorrel. The individual plants have little to commend them, but from a distance, when they wave with the grasses they give to this red sea an appearance of changeable silk.

The red clover is protruding its ruddy blossoms, while the little white one creeps along by the roadside. Much prettier than either, is the now rather common alsike, with delicate pink heads. It is the *Trifolium hybridum* of science. Equally fine is the pompom-like crimson clover now and then grown in New England, *Trifolium incarnatum.*

Hidden away in the grass are the flowers of mouse-ear chickweed—a bad weed, as is also the very pretty little speedwell. Most of our weeds are foreigners from Old England. Perhaps they were passengers on the Mayflower and sprung up first upon the Plymouth coast. They own a pedigree that antedates Hastings and the Conqueror. King and president are all alike to them. Their office is to make the world more beautiful. It is a simple duty—but is faithfully performed. Who would wholly eradicate these humble servants that minister to our delight? Be sure, that as the children love them, they are good.

Brown University, Providence, R. I.

A NEW VERMONT BLACKBERRY.

BY W. H. BLANCHARD.

The species of blackberry here described and named belongs to the *Setosus* class, but it has little in common with the plants generally known as *Rubus setosus,* Bigelow, and to which Prof. C. H. Peck in 1891 gave the name of *R. hispidus* var. *suberecta,* and which Dr. P. A. Rydberg in 1901 named *R. nigricans,* these being generally soft-stemmed and beset with a multitude of soft bristles with as many glanded hairs interspersed.

RUBUS GROUTIANUS, n. sp. small, erect, five-foliate, glabrous plants with very numerous strong, bristle-tipped prickles and a short, bristly inflorescence.

New Canes.—Stems erect, 1½ to 2½ feet high, reddish, glabrous and glandless, nearly terete with angled pith. Prickles numerous, 150 to the inch of stem, recurved, bristle-tipped. Leaves rather small, five foliate, yellow-green on the upper surface, lighter on the under surface, glabrous on both. Leaflets oval, long-pointed, outline entire, finely and doubly serrate, the middle one widest, often somewhat rounded at the base, the others wedge-shaped. Petiole and petiolules grooved little or none, glabrous, prickles numerous, strong but slender, hooked; the petiole of the middle leaflet less than one-half inch long, the other leaflets sessile.

Old Canes.—Stems erect, prickles considerably impaired. Second year's growth consisting entirely of leafy branches tipped with inflorescence, one from the axil of each old leaf. Branch stems terete, zig-zag, six to nine inches long, prickles, glabrous, hooked. Leaves three-foliate, thin; leaflets short-pointed, broad-oval, rather coarsely serrate, glabrous; the petiolule of the middle leaflet short, the other leaflets sessile. Inflorescence a short raceme, one to one and one-half inches long, the axis and slendler pedicels set at a great angle to it densely beset with slender prickle-bristles, straight and set at right angles to their axis with an occasional glanded hair on some plants and a faint pubescence. Flowers seven-eighth inch broad, petals slender, less than one-half as wide as long, appearing the last of June. Fruit globose, one-fourth inch or more in diameter, drupelets rather large, black, not productive; ripe the middle of August.

Type Stations: In Wait's pasture, West Wardsboro, Windham County, Vt., one mile east of the village, at an altitude of 1,700 feet, and in the road between the church and town house in Stratton, Vt., four and one-half miles west of the West Wardsboro station at a somewhat higher elevation. Open places, dry ground.

I found this species June 27, 1904. It is very abundant at the first named station, scattered over a large pasture. The stations in Stratton show that it is not a local plant. The name I propose is to commemorate that of people who were once numerous and prominent in Stratton, and for whom Grout Pond is named, and whose descendants are scattered widely, including Dr. A. J. Grout, well known to moss students; but more especially to commemorate the hero of a famous anecdote. He was a precocious boy but five years old, who wandered away a few miles on the crust in the sugaring season and came into a little sawmill village called Ireland. Being told that he was in Ireland he asked them to help him find his way to "Stratton, North America."

Westminster, Vt.

MANNA.

MANNA is collected from the "*Tarfa,*" or tamarisk, the manna ash, the camel thorn, the larch, the cedar, the Australian *Eucalyptus vimenalis* and even some edible lichens, such as *Lecanora esculenta*, and its allied species are known by this name. According to Burckhardt the manna from the tamarisk (*Tamarix gallica*) drops from the thorns, on the sticks and leaves with which the ground around these trees is usually covered, and must be gathered early in the day or it will be melted by the sun. "The Arabs cleanse and boil it, strain it through a cloth, and put it into leathern bottles, and in this way keep it uninjured for several years. The manna ashes (*Fraxinus ornus, F. Europaea* and *F. rotundifolia*), yield manna in consequence of a puncture made by an insect resembling the locust, known as *Coccus mannifarus.* The substance is fluid at night and resembles dew, but begins to harden in the morning. *Fraxinus ornus* was introduced into England in 1730 by Dr. Uvedale.

The camel thorn, which grows in Northern India and Syria, produces the description known as *Al baj*, or Persian manna. The larch and the famous cedars of Lebanon also furnish a manna of their own, but although prized and eaten by the natives of the countries where they are found, these kinds of manna do not seem to possess the useful properties of the manna ash, which is the manna of European commerce. The Australian *Eucalyptus viminalis* exudes crumbs of an edible manna, which is very sweet, and is used to produce the opaque drops called honey-manna, or melitose.

Of the edible manna lichens, *Lecanora esculanta,* and *Lecanora tartarea,* the coloring matter known as litmus is made. This kind of lichen is sometimes torn up and transported by violent gusts of wind and falls in showers several inches thick. In 1829, during the war between Persia and Russia, there was a great famine in Oroomiah, southwest of the Caspian Sea. "One day during a violent storm the surface of the country was covered with lichens, which fell from the sky in showers. The sheep immediately attacked and devoured it eagerly, which suggested to the inhabitants the idea of reducing it into flour and making bread of it, which was found to be palatable and nourishing."

During the siege of Herat, there is mention made of a hail of manna which fell upon the city and provided the inhabitants with food. In April, 1846, in the government of Wilna, a rain of manna occurred, forming a layer upon the ground three or four inches thick. It was of grayish-white color, rather hard, irregular in form, inodorous and insipid. It is to be found in the Great Desert of Tartary, on the steppes to the north of the Caspian Sea, in the Altai Range, in South America and in Algeria.—*Indian Planting and Gardening.*

A SALAD FRUIT FROM THE TROPICS.

AS our contact with the tropics becomes more and more intimate, and transportation facilities are improved, the number of fresh food products received from tropical countries is rapidly increasing. Among the most promising of such articles is the avocado, (*Persea gratissima*) still little known, but rapidly increasing in favor. The avocado, though technically a fruit and usually referred to as such, is from the culinary standpoint no more a fruit than the cucumber. It is more accurately described by the term "salad fruit," and may be said to stand alone as the only fruit that when ripe is eaten almost exclusively as a salad. The nearest approach to this is perhaps the olive, which is eaten more as a relish. This unexpected role no doubt accounts to a large extent for the dislike or indifference often professed by persons tasting the avocado for the first time. As in the case of the olive, where the novice usually describes the fruit as an insipid pickle, the appearance of the avocado leads one to expect a sweet or acid fruit, and the more or less unconscious disappointment usually leads the experimenter to pronounce the avocado tasteless and oily. One writer describes it as having a "taste not much like that of our pears (the avocado is often called 'alligator pear'), and in first trying to eat the fruit one may pronounce it a poor pear, but a good kind of pumpkin," and adds the charitable suggestion that "cooking or preserving may bring out the hidden virtues."

Few persons who live for any length of time in countries where avocados are to be had fail to acquire a taste for this delicious salad fruit. It is the rule, however, that the taste for an entirely new article of diet has to be cultivated, and a food which was unknown to our fathers and which we meet for the first time after our tastes have been formed is seldom accepted at the first trial. In most cases it is only after repeated attempts, prompted usually by the assurances of the initiated, that a fondness for the strange article begins to grow. The human taste is, however, fairly uniform, and a liking for any food that is popular in its native country is usually acquired by the stranger if his first attempts do not create a prejudice so strong as to prevent further experiments. As examples of foods that when first tried outside of their native country were by most people either disliked or considered insipid, but which have since become firmly established may be mentioned olives, bananas, artichokes, chocolate, tomatoes, curries and peppers. With avocados the taste is usually acquired after two or three attempts, and many profess a fondness for the fruit at the first trial. That the taste when once acquired amounts to almost to a craving is attested by prices paid for the fruit in the northern markets, where 15 cents each is about the lowest figure at which they can be bought, and good fruit usually sells as high as 30 cents, though 50 or 60 cents is not an uncommon price. The avocado may thus be said to have taken the first steps along the lines by which most foreign fruits have been successfully introduced. An early impetus was received when the fruit was served on the tables of the rich and fashionable, its intrinsic merit being aided, without doubt, by the desire to inaugurate a novelty at once rare and expensive. The tendency to imitate this use assisted in increasing the demand until the fashionable hotels were able to score a point by adding the fruit to their menus. From this stage to that of introduction into the markets and fruit stores, where the general public will make its acquaintance, is, perhaps, the slowest and most crucial step in the history of a successful new product, and one that the avocado is at present undergoing.—*From Indian Planting and Gardening.*

Note and Comment.

WANTED.—Short notes of interest to the general botanist are always in demand for this department. Our readers are invited to make this the place of publication for their botanical notes. It should be noted that the magazine is issued as soon as possible after the *fifteenth* of each month.

INSECTS AS AIDS TO FUNGI.—The plant world is often divided by botanists into the two groups of seed-plants and spore-plants, or, as we commonly call them, Phanerogams and Cryptogams. The distinction is based upon the fact that one division is reproduced by seeds, while the other effects the same end by spores. The seed is a familiar object; as an example of spores, the dust-like particles composing the "smoke" of puffballs may be mentioned. The seeds are rarely distributed by insects—flowering plants find the wind, water, birds and mammals more useful—but the spore-plants, which may also make use of the wind and water, often seem to specially invite the insects. The ergot fungus of rye provides a sugary solution with its summer spores, to induce insects to carry them about, and some of the spores of rusts are similarly equipped. In the carrion fungi the offensive odor of the spore-mass attracts flies, which, alighting upon the sticky spores, carry many away attached to their legs and bodies. Although we make a distinction between seed-plants and spore-plants, there are really no seed-plants that are not spore-plants also, for the pollen grains are spores. Reflecting upon this we see that even the highest seed-plants, though they may adopt other agencies for their seeds, have found it convenient to call the insects to their aid in transporting the spores.

Edible Foliage Plants.—Certain species of *Coleus* are so extensively used in this country for the decorative effects of their variegated leaves that they are generally known as foliage plants. It may be news to some that in other parts of the world the species of *Coleus* have other uses. In India *Coleus barbatus* is cultivated for its tuberous roots, which are eaten as pickles. The plant is said to be ornamental enough to be planted among other flowers. The bread-and-butter plant (*Coleus aromaticus*) is another member of this genus cultivated in India. It has fragrant, fleshy leaves and is often eaten as a salad with bread, whence the common name.

Inspirations to Botanists.—There was a time, of course, in the lives of all great botanists when they knew absolutely nothing about botany. Some few came from botanical families, and so almost unconsciously acquired the rudiments of the science, but it is interesting to note what trivial things turned the attention of others toward plants. Thomas Nuttall was a printer, and came to America to follow that trade. Happening to become curious about the Virginia creeper, he grew interested in botany and soon became famous in the study. Asa Gray had his attention first turned to botany by the little spring beauty (*Claytonia Virginica*). Gray's early botanical studies were greatly advanced by his association with Dr. John Torrey, who, according to report, obtained his early botanical knowledge in a peculiar way. Torrey's father was sheriff in New York City, and during his term of office a certain early botanist was imprisoned for some small offense. From this botanist young Torrey obtained his first start in botany. Without doubt many of the readers of this paragraph can distinctly recall the circumstances that inclined them to the serious study of plant-life.

Definition of a Flower.—Even the botanist finds it hard to say exactly what a flower is. An essential part of every flower is either pistils or stamens, and usually both are contained in the same flower. These organs, however, are morphologically transformed leaves bearing spores of two kinds, the small spores being known commonly as pollen and the large ones as ovules. But even among the fern allies, such as the selaginella, there are leaves of this kind, so that under this definition it would not be incorrect to claim that some fernworts have flowers. If, however, we define a flower as one or more sets of essential organs surrounded by floral leaves, we will have to exclude the conifers and many amentaceous plants from the lists of those that bear flowers.

The Striped Maple.—One of the handsomest small trees in any locality is the striped maple (*Acer Pennsylvanicum*). The deep green bark striped with pure white is most noticeable during the colder months of the year, but the drooping racemes of straw-colored flowers in early spring and the fresh dark green of the leaves in summer are equally attractive. With us the tree is seldom found in cultivation, but the British are more appreciative and often plant it. It is hoped that our own country will not have to be settled as long as those of the Old World have before we appreciate the beauty of a plant without regard to its place of origin. In England the tree is sometimes called snake's bark maple, though it may be questioned whether anyone ever saw a snake with bark on it! There seems to be no use for coining this absurd name when the plant already has several more expressive. In this country, in addition to the name at the beginning of the paragraph, it is called moosewood, whistlewood and striped dogwood.

Style and Stigma in Pollination.—There is probably no student of flowers that does not know, in a general way, what offices are performed by the style and stigma preliminary to fertilization, but many may not be aware of the exact nature of these offices. When the pollen falls upon the stigma it begins to germinate and gives rise to a structure called the pollen tube that pushes down through the style to the ovules. But pollen tubes cannot be built without nourishment and therefore the interior of the style consists of a nutritive tissue upon which the pollen tube can draw. The stigma is really the point at which this nutritive tissue comes to the surface and this accounts for the fact that the stigmatic surface is not always at the apex of the style. In some long styles the interior is hollow but lined with nutritive tissue. In cases where a single style serves for a several celled ovary a branch of the nutritive tissue is given off to each compartment.

The Interpretation of Species.—At present there are no unvarying rules for distinguishing new species. Whenever a student discovers an unrecorded difference between two plants he is at liberty to consider the difference specific if it appears so to him. At the same time, we are all aware that what may appear specific differences to one may not to another. Real specific differences, however, are not matters of individual opinion or judgment, but are more fundamental. By the long and tedious investigation of embryonic structures we may at last find just how much of a plant's character is due to its environment and how much is due to something deeper. When specific lines are finally drawn in this manner the botanist who has based a lot of new species upon mere fuzziness of leaves, color of flowers or size of fruits will be a surprised and disappointed individual.

Editorial.

With the beginning number of the new volume of this magazine a change will be made in the number of issues. The summer lecture engagements of the editor now take so much of his time that during this season the magazine is unavoidably delayed to the great annoyance of readers and publishers alike. With a view to escaping this in future, we purpose issuing ten numbers a year, skipping the months of July and August. At the same time the magazine will be increased in size by the addition of four pages to each issue, so that readers will receive exactly as much each year as before. We do not intend to lessen the amount of matter published, but simply to put it in more convenient issues. The September number will therefore be the first of the new volume, and this will be issued in late August so that the period in which no number is issued will not be long. The new volume will be improved in various ways, but from the letters recently received we appear to be publishing about the kind of matter wanted and shall continue on the same general lines. With this issue, bills will be sent to all whose subscriptions have expired and we trust that the excellence of the numbers issued thus far this year will incline every reader to a prompt renewal.

* * *

This magazine desires illustrated articles for use as leaders in the numbers of the new volume and we hereby offer a year's subscription for each illustrated article. We are well aware that this is not a magnificent price to pay, but it is better than the other magazines pay and we hope is only preliminary to a better price. It depends largely upon how the public receives the project. The illustrations may be either photographs or line drawings in India ink and must *illustrate.* We do not care especially for illustrations that cannot be explained as well by the text. Photographs of fine specimen plants or groups of plants are desirable and so are drawings of interesting flowers, fruits, etc. In making such illustrations due regard should be had for the size and shape of our frontispieces. The text accompanying the illustration should follow the same general treatment we have given in previous issues. Articles on how to distinguish the various species in groups of showy wildflowers, articles on single plants of interest and similar subjects will be welcome.

* * *

It seems curious that in regions where Nature is most lavish with her botanical treasures, students of the plants are most difficult to find. Evidently the people at large take very little interest in the subject, for it is noticed that books on the botany of the South, whether technical or of a more popular nature, find most of their purchasers in the Northern States. It would be interesting to know just why this section of our country is so lacking in an interest in the plants. Possibly it is because botany is not given much prominence in school and college work there. When one considers the abundance of available material ready to the hand of the botany teacher during the very season when school is in session, he wonders that every school has not an enthusiastic class in botany, and every town a botanical club.

BOOKS AND WRITERS.

A few years ago the study of botany was supposed to begin and end in pulling flowers to pieces and learning their names. Now-a-days all this is changed, and the well-regulated text-book for school use invariably begins with seeds and follows the development of the young plant through stems, roots and leaves to the flowers and fruits. Such courses are intended to cover a half year of school work, but when it comes to the course in botany for a second half year, opinions begin to differ. The recently issued "Introduction to Botany," by W. C. Stevens, presents a somewhat composite course, which includes a brief survey of the flowerless plants, a study of typical seed-plants and ecological and geographic botany. In the first half of the book we note numerous new and excellent illustrations, which cannot fail to make the text clear to the average pupil. The second part is equally well illustrated, but in the opinion of the reviewer not enough attention is given to the lower orders of plant life. The selection of typical seed plants to take the place of the dreary dissertations on plant relationships common to most books is a commendable feature, and the chapters on the adaptations and distribution of plants are equally good. There is an unusually good glossary. The inclusion in such books of a manualette of a few spring flowers cannot be commended. If systematic botany is to be taught at all, a real and comprehensive manual should be selected. The text of the present volume is excellent, and will no doubt add to the interest as well as to the knowledge of the pupils using it. (Boston: D. C. Heath & Co., 1905; $1.50.)

The third annual meeting of the Botanical Symposium will be held from July 2d to 9th, 1906, at Mountain Lodge, Little Moose Lake, Old Forge, New York. Through the courtesy of the members of the Adirondack League Club the privilege of occupying the club house for one week is extended to the members of the conference. Tickets should be bought to Fulton Chain Station on the Adirondack Division of the N. Y. C. & H. R. R. Single fare from New York City, $6.46. Board $2.00 to $3.00 a day. Stages will meet the party at Fulton Chain Station. Botanists are requested to notify Mr. Joseph Crawford, secretary, 2824 Frankford avenue, Philadelphia, Pa., if they intend to attend the Symposium.

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